FOOD ENGINEERING

MAY 1953

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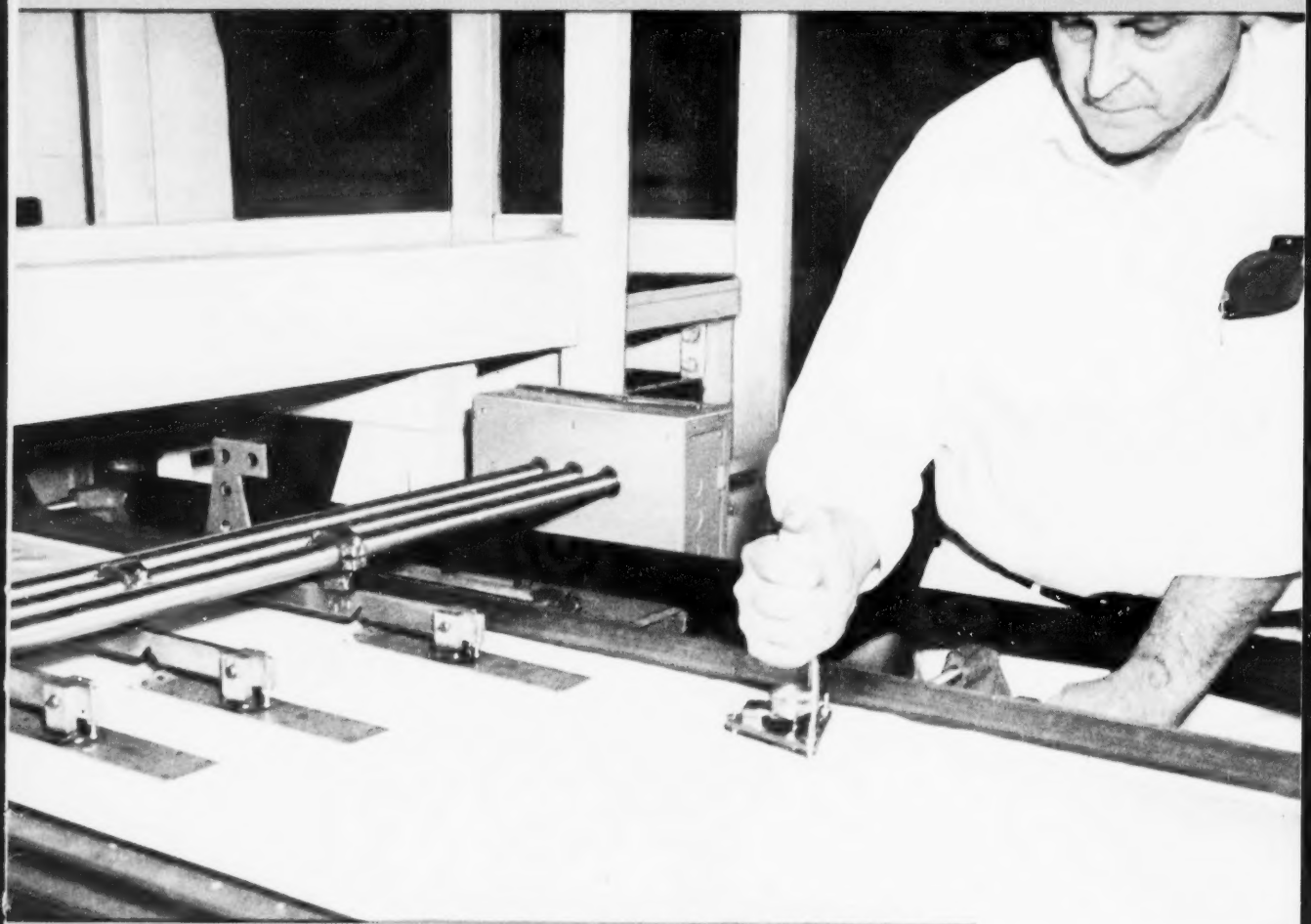

FLOATING "SHOES" on Mars' continuous candy sheet spot 0.003-in. thickness variations. Hand gage checks shoes. (Page 57)

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. . . for help on your job. It brings needed data on equipment, ingredients, supplies — also useful catalogs. As you read this issue, circle page numbers on

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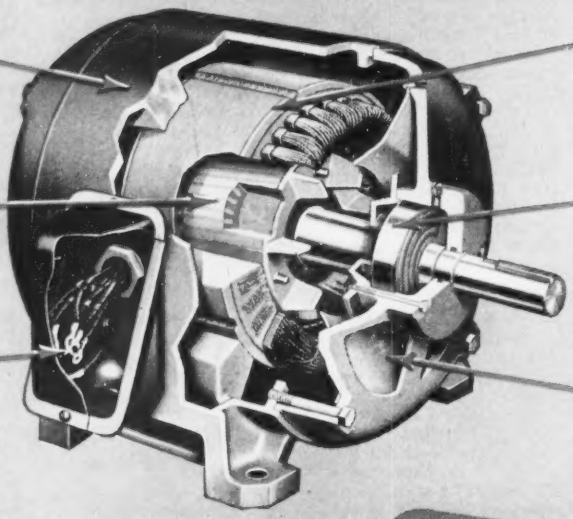
Look for These 6 Signs of Good Motor Design



1

FRAME — Rigid cast iron. Designed to hold bearing alignment, resist corrosion, prevent distortion under any normal operating condition.

2

ROTOR — Die cast aluminum for maximum strength. Practically indestructible in service.

3

CONDUIT BOX — Provides plenty of room to connect leads. Adjustable to any position. Long leads make connection easy.

4

STATOR — Multiple-dipped, baked after every dip. Builds up tough protection against heat, moisture, corrosion.

5

BEARINGS — Double shielded with provision for in-service lubrication if desired. Will run for long periods without attention but can be greased if conditions demand it. Thoroughly protected against outside dirt.

6

VENTILATION — Drip-proof with plenty of internal air circulation to prevent hot spots.

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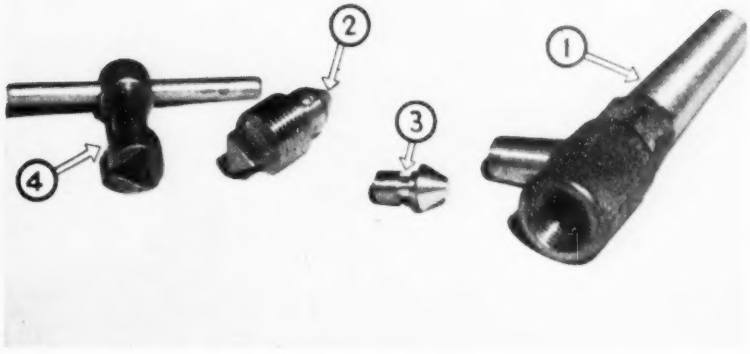
PRACTICAL IDEAS



New Type Cask-Sampling Spigot

When we designed, built and installed our own wine-cask sampling spigots, we put an end to an accident hazard, and at the same time, cut the loss of product.

If 500-600 casks in our plant were not equipped with some sampling draw-off, it would be necessary to take frequent samples from surface of wine, after climbing to tops of casks. A real accident hazard would thus be incurred and excessive man-hours consumed collecting samples.

Another alternative, was to depend on conventional spigots, use of which was accompanied by too much loss of wine due to leaking, improperly closed or spigots accidentally knocked open.

Now, sampling faucets we designed (see left photo) are located on casks where they can be reached easily and safely. Waste has been eliminated since spigots can be opened only by the special keys of samplers. When closed, they are leakproof-seated, and cannot be accidentally or intentionally opened without a special key. Despite these advantages, draw-off units are of simple construction, made at reasonable cost.

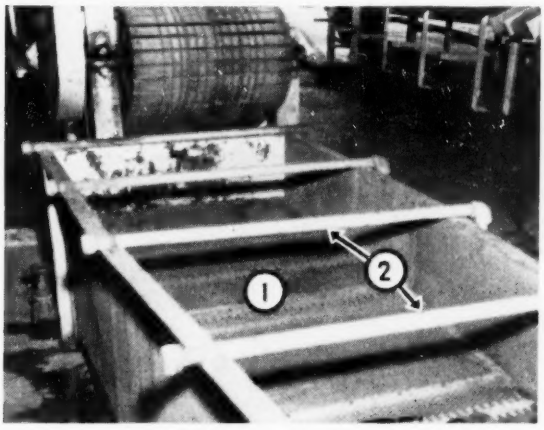
Here are details of design:

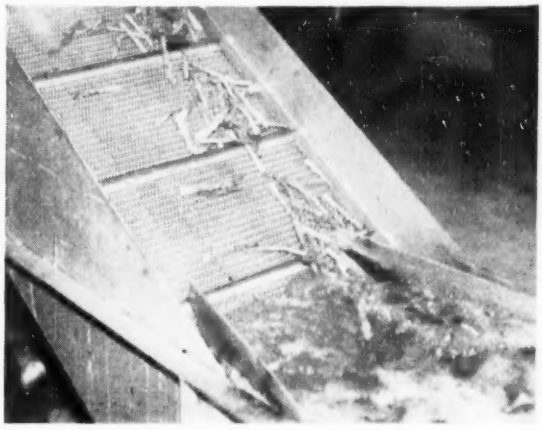
Spigot proper—(1) in right photo—is a bronze casting into which the valve seat is milled. To make it fit tightly in cask, tapered portion of spigot is threaded.

Valve assembly (2) includes cone-shaped, plug-type disk (3), detachable from its threaded holder when set screw is loosened and "valve stem", a short triangular extension of plug-disk holder.

Recessed into special key (4), which serves also as a detachable valve stem, is a triangular hole or socket, shaped to fit over three-sided extension on plug-disk holder.

Now, to seat valve, disk assembly must be screwed within spigot proper, far beyond possibility of manipulation with a wrench or pliers. Opening valve is possible only through insertion of one of few special keys.—*Joseph Chertak, Machinist, Garrett & Company, Inc., Brooklyn.*





Washes With Steam Agitation

By replacing mechanical submerging with violent turbulence generated by live steam, efficiency of our asparagus washer has been profitably improved.

Not only are more sand and silt loosened and washed from the grass by this method because of the improved washer design but this refuse is continuously removed from wash water and discharged from unit.

Here is how the washer itself was improved and how steam agitation is applied:

First, angle iron was welded to washer sides about a foot from top to serve as a support for a removable perforated-metal false bottom—(1) in left photo. Advan-

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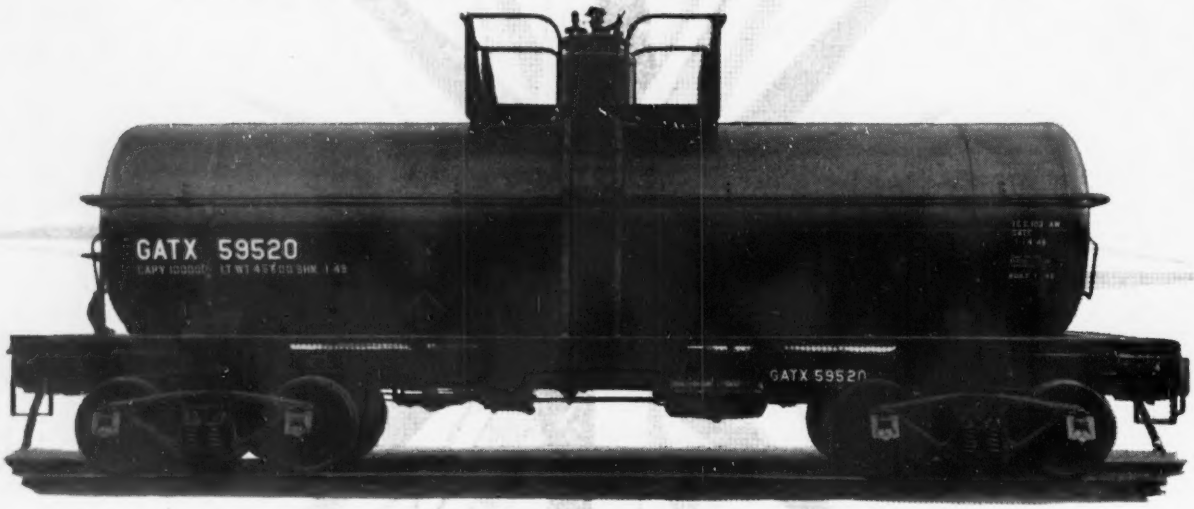
If you're planning a new plant, have General American help determine your future bulk shipping needs. Our experience gained in designing, building and operating 46,000 GATX tank cars of hundreds of specialized types will prove valuable to you.



General American Transportation Corporation

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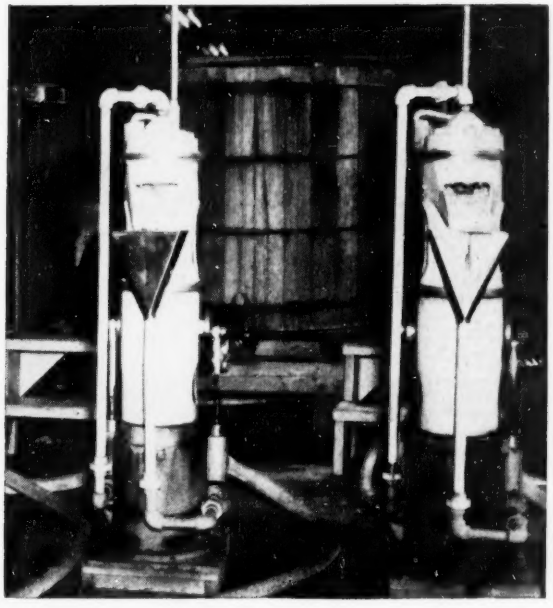
tage of this screening device is that it allows sand and silt to escape permanently from turbulent wash water to quieter water below.

By cracking valves on tank bottom drains, water, in controlled amount, flows out constantly, carrying silt and sand with it. Daily hosing-out and cleaning of tank is facilitated by removable nature of false-bottom sections.

Steam for agitation is directed down into wash water from perforations in series of capped pipes (2) crossing top of washer at 2½ ft. intervals. Directing steam down through surface of water drives air into it to increase turbulence (right photo) and to avoid any steam bump or hammer.

Washer overflow is so adjusted that water level is maintained as near steam inlets at tank top as possible without overflowing. Steam inlets function best when they are near, but not touching, agitated surface of the wash water.

Not only does steam cause greater wash water turbulence —an asset to dirt removal, but also injects heat—a further asset in preparation for the next operation, steam blanching.—*L. M. Jordan and Dorsey Davis, Phillips Packing Co., Cambridge, Md.*



New Way to Control Sauce Viscosity

Rapid and accurate method for maintaining close control over viscosity of liquid mixtures and finely divided solids has been worked out in our plant. Here is how it is applied to assure uniform consistency of our A. 1. Sauce. And this is despite inevitable variations in consistency which are encontered from one pack to next with such a principal component of the sauce, as, for example, tomato puree.

After cooking and aging, sauce is sampled by our control laboratory and viscosity checked. From this data they calculate what portion of the tank's sauce should be run through a Morehouse mill (see photo) for thickening. Viscosity of this portion is sufficiently increased—as solid particles are reduced in size by grinding—to bring the original batch, to which the milled portion is returned, up to our specification for thickness. Reducing particle size increases viscosity.—*W. R. Van Meter, Chemist, Food Div., C. F. Heublein & Bro., Inc., Hartford.*

Efficient Trash-Can Rack

Since installing a raised support for refuse drums, litter near the trash recepticles has disappeared and even the floors beneath are kept spotless. Much of this improved tidiness can be attributed to the design of the rack (see photo).

Surface on which drums rest is made by welding to the frame the edges of angle-iron cross-members with the angles pointing up. Any grease or dirt accumulated on the rim of the drums, when returned after emptying, is scraped off by the inverted-V cross-members. It then falls to the painted floor below and is immediately swept up.

Painting supports white or light grey is a stimulant to tidy maintenance of the area. Paint on the cross-members is not scraped off, since only the top of the angle comes in contact with the drums.—*James Owens, Fleet Manager, Abbotts Dairies, Inc., Philadelphia.*

$50 Extra for Best Item

You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed and if it is judged best for the month, you will get an additional payment of $50.

Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

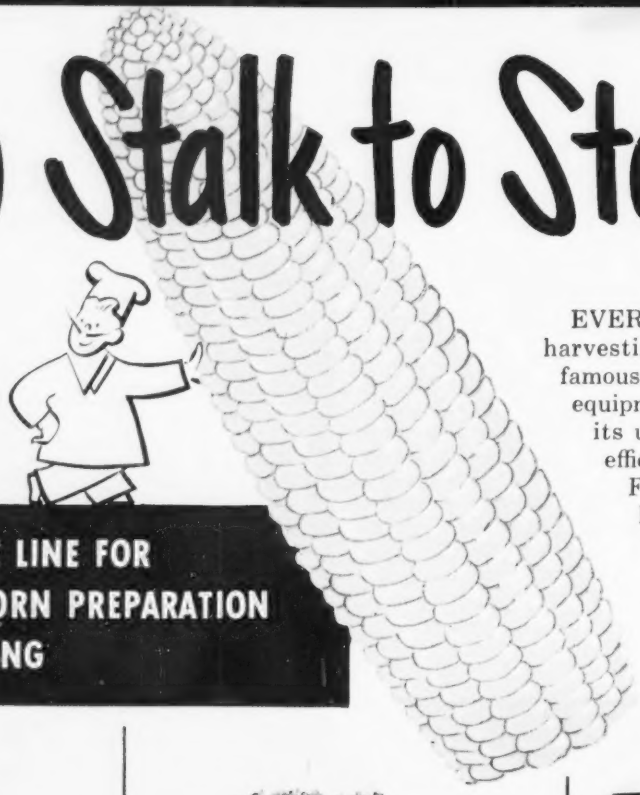
Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

MARCH PRACTICAL IDEA voted best was "Infra-Red Solves Humidity Problem," sent in by D. C. Cornell, Cream of Rice Superintendent, Grocery Product Co., West Chester, Pa. Discussed was application of this type heat at carton glue-rolls to bring down excessive R.H. and hasten drying of containers.

from Stalk to Storage

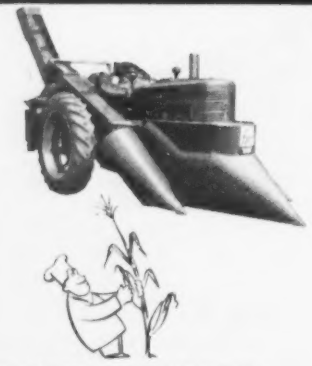
with fmc

PERFORMANCE PROVED CORN EQUIPMENT



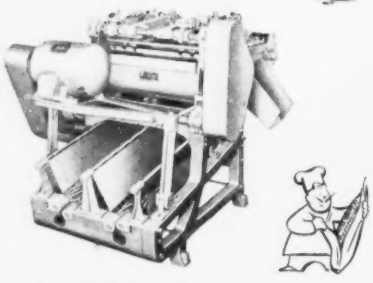
THE COMPLETE LINE FOR PROFITABLE CORN PREPARATION AND PROCESSING

EVERY STEP OF THE WAY from harvesting to casing you can rely on famous FMC "Stalk to Storage" corn equipment to keep costs down, profits up—operations smooth and efficient. For more than 50 years FMC has pioneered in this highly specialized field to meet every requirement of the corn canner & processor. Whether you pack whole kernel, cream style or corn on the cob, canned or frozen, check with FMC *first*—for foremost efficiency.



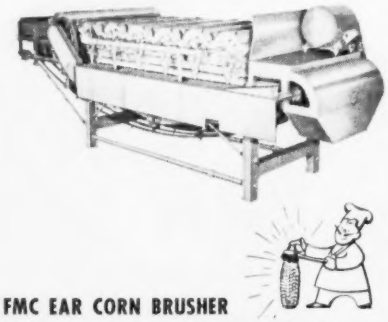
FMC SWEET CORN HARVESTER

Gets all the corn in the field without damaging ears. Replaces a hand picking crew of 10 for top yield.



FMC DOUBLE HUSKER

Completely strips husks and severs butts at up to 2½ tons of corn an hour. Resultant ears are clean with kernels intact.



FMC EAR CORN BRUSHER

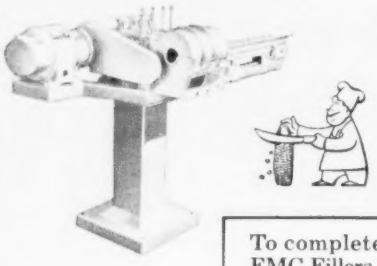
High-speed revolving brushes wash and scrub every kernel of every ear. Two models: the larger handles output of 20 huskers; the smaller, that of 8 huskers.

FMC PEERLESS CORN WASHER

Tumbles, scrubs and rubs ears together under powerful water sprays. Efficiently removes loose husk, silk and dirt.

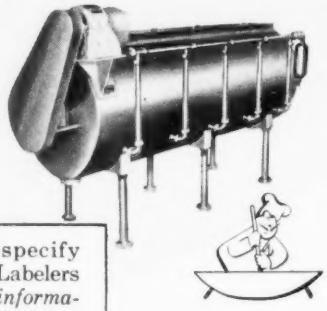
FMC UNIVERSAL CORN CUTTER

Whirling knives cut corn close and clean, the full length and contour of the ear. Provides a highly uniform cut, unmatched recovery.



FMC SANITARY BLENDING MIXER

Meets the most rigid sanitary specifications for processing cream style corn. Heavy duty stainless steel used for all contact parts. Built in 300, 400 and 500 gal. capacities.



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Canning Machinery Division

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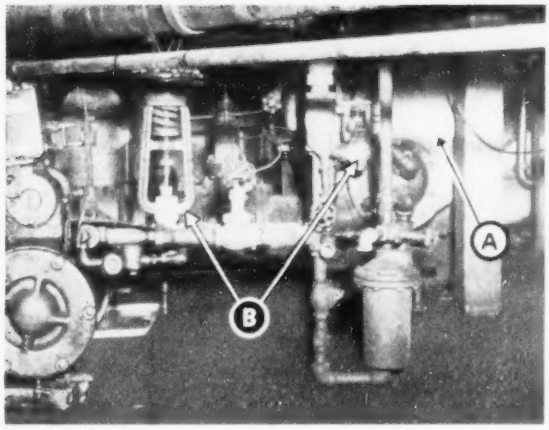
WESTERN: SAN JOSE 6, CALIFORNIA **EASTERN:** HOOPESTON, ILLINOIS



Ends Meter Damage From Cold Syrup

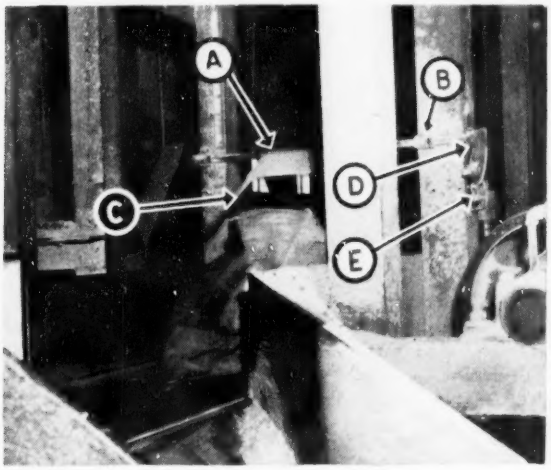
During periods of down-time, overnight, and especially during week ends, syrup in lines from storage to our processing kettles cooled and increased in viscosity.

Condition was most serious on winter Monday-mornings, with plant heated only to minimum safety temperature. At these times, meters, through which all syrups are measured into kettles, were damaged seriously frequently.

Condition ended when we added an insulated, tube-shell-type heater—(A) in photo—controlled by temperature regulators (B). Two advantages have been gained:

Now, at any time, syrup can be pumped from heater-storage tank through meters without possibility of damage from excess viscosity.

Furthermore, cold syrup entering tank from supply line is quickly heated, so temperature of syrup leaving heater can be regulated to enter kettles near top temperature required for processing, reducing cooking time per batch.—*Robt. Korn, Plant Engineer, Henry & Henry Inc., Buffalo.*



Polices Remote Conveyors

A clogged or stopped conveyor, anywhere on a quarter-mile-long transporting system between bag-filling machine and rail cars, caused unnecessary loss of man-hours before we installed a detecting system on each conveyor. It indicates on a panel at filler machine when and where flow of bags is interrupted.

This is how easily installed policing system operates:

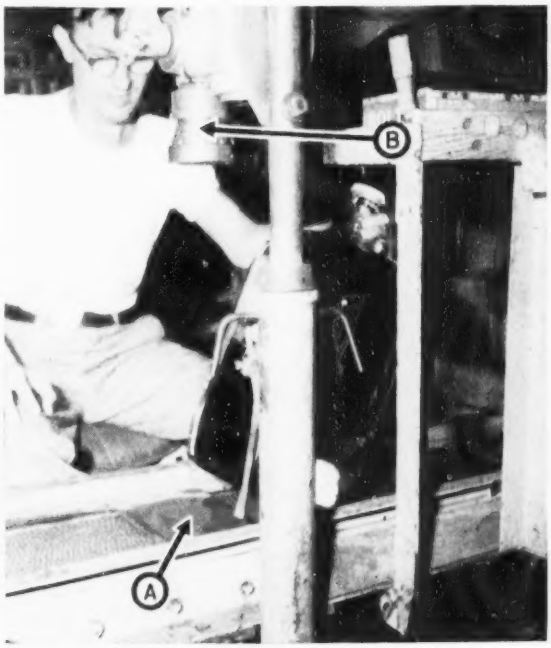
Across each belt, at ample height for clearance of bags, a horizontal shaft—(A) in photo—was suspended between bearings (B) attached to upright beams at conveyor side. Hanging from rod are two prongs (C), so spaced that a bag of feed on conveyor will strike against one or both when passing under horizontal shaft.

When latter is rotated by upswing of prongs, a cam (D) on one end of the shaft, operates a switch (E) which blinks a light at bag-filling machine supplying that conveyor system.

Either of the two choices can be made in installing system. Electric bulbs at filler may be kept lighted, except when a bag passes the trip station, or vice versa, lighted only when bag passes light control.

Consistent blinking of light, assures that conveyor is running and that no pile-up is interrupting movement of sacks.

Absence of light blink is readily noticeable, and location of trouble immediately spotted.—*F. A. Wenske, Assistant Superintendent, Plant Maintenance, Eastern States Farmers Exchange, Buffalo.*



Dead-Plate Speeds Carboy Closing

When we attached a steel plate—(A) in photo—immediately over the conveyor belt, and moved a portable capper (B) in place above it, we reduced the time and labor required to perform the closing operation on carboys containing distilled water.

Formerly, filled containers came by belt conveyor to the capping station, were transferred by hand to the machine where crowns were applied, and then were manually returned to the conveyor.

Shifting to capper and back was not only a slowing down procedure, but tiring to operators and hazardous to the large, heavy bottles.

Now, since a dead-plate has been welded to the sides of the conveyor, just high enough above the belt to clear it, the operator merely tilts the carboy onto the plate, caps it, and then tilts it back onto the belt.—*C. Edgar Hires, Chief Engineer, Chas. E. Hires Co., Philadelphia.*

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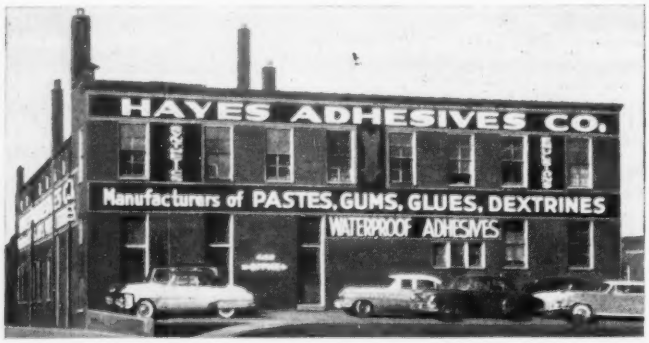
GREATLY increased demand for "Paisley Scientific Adhesive Service" has made further expansion necessary. The purchase of HAYES ADHESIVES Company of St. Louis with its three plants has made possible immediate addition of the manufacturing and laboratory facilities needed. Now, customers of both PAISLEY and HAYES can expect faster and more efficient Scientific Adhesive Service than ever! The combined MORNINGSTAR-PAISLEY-HAYES product lines will be available and serviced through our sales offices in principal cities.

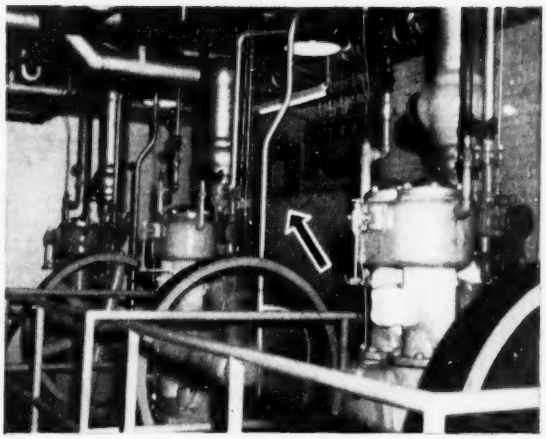


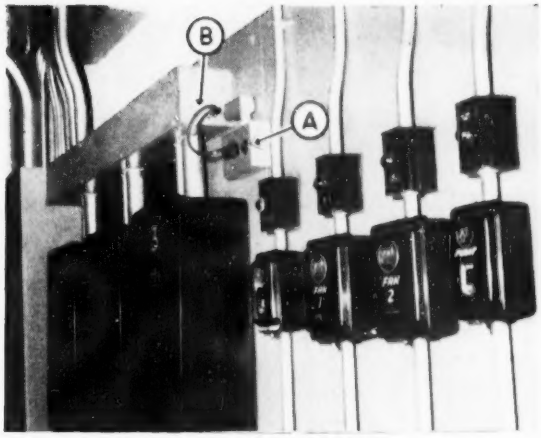
The Hayes Adhesives Co., Inc. Plant No. 1 in St. Louis, Missouri, recently acquired by the Morningstar, Nicol organization for operation by its subsidiary, Paisley Products, Inc., Chicago.

The Natural Gum Department Of Innis, Speiden & Co. Was Recently Acquired By Morningstar, Nicol, Inc.

THE Natural Water Soluble Gum Department of Innis, Speiden & Co. together with its personnel and plant in Jersey City is now a department of Morningstar, Nicol, Inc. Morningstar's hundred years' successful experience in the importation and scientific processing of natural plant products, starches, flours and gums offers many superior advantages to users in all industries.

For more information, use coupon on page 159.





Data for 3 Units With 1 Recorder

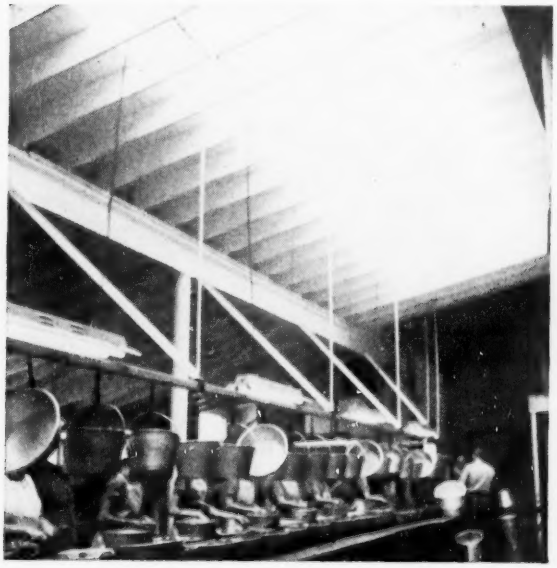
Refrigeration control system at our plant was adequate to stop and start three compressors supplying refrigerant to our low temperature warehouses. However, the only means of checking the performance of each unit was to keep an operator constantly on the job.

Thus, at undue labor cost, it was possible to keep round-the-clock records of compressor performance including length of cycles, stops, starts and pressures.

Simpler, less expensive method was to put recording instruments to work, especially if one recorder could be made to do the job of intermittent recording since this arrangement would be ample for performance records.

This is how one recording instrument system was installed to permit selection of compressor to be checked:

Tubing was piped from a control valve on each compressor line to control instrument (arrow, left photo). Electric circuit which operates instrument cut-in control-valve of each compressor is taken from motor starter line of that unit. These lines are wired to a 3-station outlet—(A) in right photo—so that performance of any one of compressors can be recorded for an hour, a day or week by plugging-in instrument lead (B) to motor circuit of that unit.—*H. F. Davis, Chief Engineer, Danahy-Faxon Stores, Inc., Buffalo.*

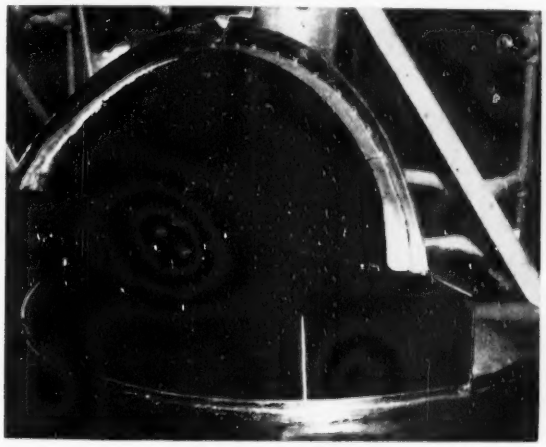


Cuts Skylight Glare, Improves Morale

In center section of our plant where large numbers of employees are engaged in trimming and inspecting, skylighting reduced need and attendant cost of daytime electric lighting over a wide area of plant.

Natural light not only increased visability for better trimming and inspecting, but added cheerfulness. However, intense midday-midsummer glare, when conventional skylighting was employed, increased sense of heat and fatigue.

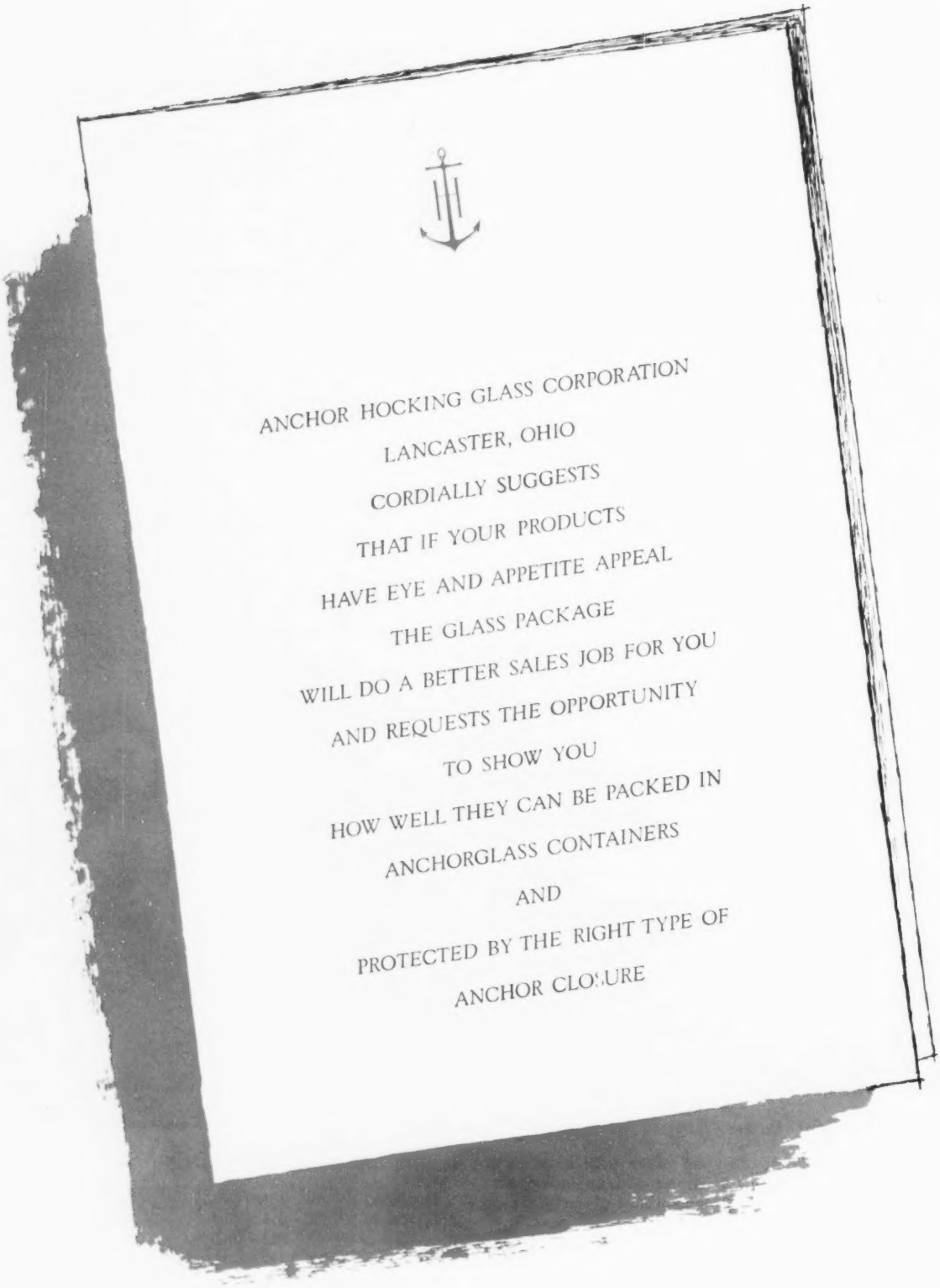
Then conventional roof-light panes were replaced by large, approximately $\frac{3}{8}$ in.-thick corrugated plastic sheets (see photo). Light intensity is not noticeably decreased but there is no longer a glare to discomfort workers.—*W. A. Free, Jr., Hungerford Packing Co., Hungerford, Pa.*



Inside Lip Ends Kettle Drip

Overhang of our dished kettle-lids allowed condensate collected on inside of cover to escape. Result was wet floors caused by drip from lid.

Then we installed a $1\frac{1}{2}$ in. stainless steel lip (see photo), following lid curvature, to fit just inside kettle rim. Condensate now drips inside kettle and not on floor.—*Tony Aloi, Production Foreman, Gerber Products Co., Rochester, N. Y.*



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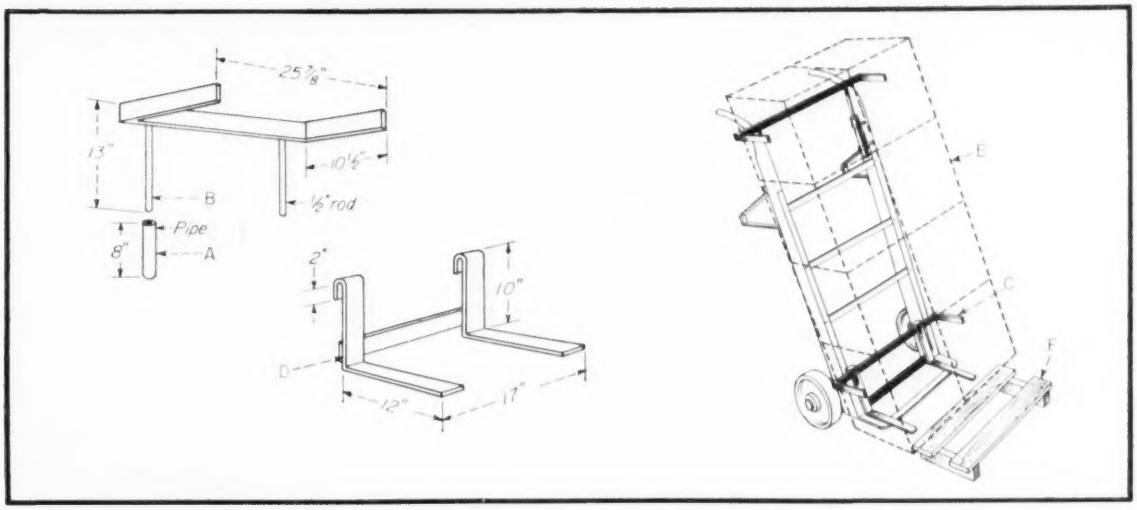


Hand Trucking Speeded

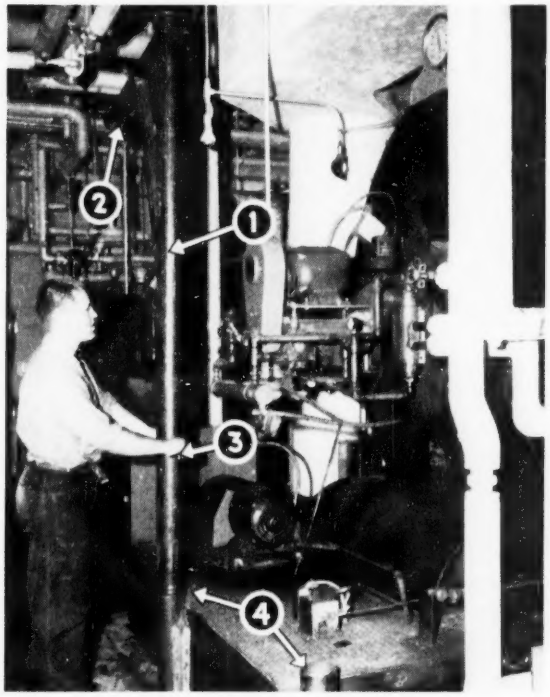
With the aid of easily fabricated handtruck attachments and economically constructed small pallets, it is possible to transport more cartons per truck load, move them as a unit, and speed warehouse operations.

This is how attachments are made and pallets constructed:

First, two pieces of pipe are cut—(A) in sketches—and attached to inside of truck uprights near handles. Into these are filled the rods (B) that hold upper carton guides (C) made to dimensions shown. Next, from 2-2½ in.-wide strap-iron, ½-⅜ in. thick, a U-shaped form (C) is fabricated to same dimensions as upper brace. Support is then attached to uprights approximately 10 in. from lower ends.

Now, the ends of the bottom rest (D)—also made to dimensions shown—are hooked over lower cross-brace. Thus, truck (E), using pallet, can transport eight average-size cartons per trip. Varying support and brace sizes will permit trucking increased loads of different sized cartons.

Pallet (F) can be made with two pieces of 2x2 in. hardwood of length equal to width of a case, spaced apart sufficiently to permit entrance of truck prongs. To the 2x2's two cross pieces of 1x6 in. lumber are attached.



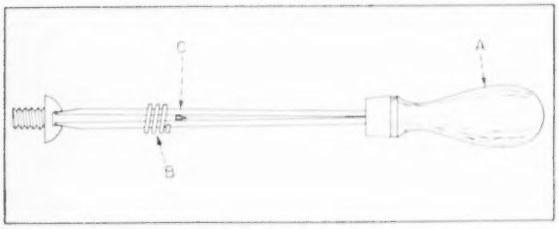
Burner Handling Simplified

Removing heavy burner assemblies or boiler ends was a dangerous and costly operation before we installed a removable crane to ease tasks, and reduce danger.

Lifting unit—(1) in photo—is made of heavy gage tubing with cross-bar extension (2) at top, supported by angled brace. By means of a rod (3) through vertical pipe, crane can be rotated in either of several bases. These are sections of tubing (4) welded to boiler foundation.

Several pivoting bases are provided at each boiler base, permitting approach to heavy units from different angles for dismantling, reassembling and manipulating the heavy assemblies.

When not required for repair jobs, crane can be removed from supporting base, clearing working space around burners.—*D. Bradshaw, Plant Engineer, H. A. Johnson Co., Boston.*



Driver That Grips in Screw Slot

Tool is made of two lengths of spring steel normally held tightly together at top by a handle—(A) in sketch—and lower on the shaft by a coil spring (B). After drive end is inserted in screw slot, forcing steel wedge (C) toward handle expands the two sections to firmly grip screw.—*W. E. Warner, Essex, England.*

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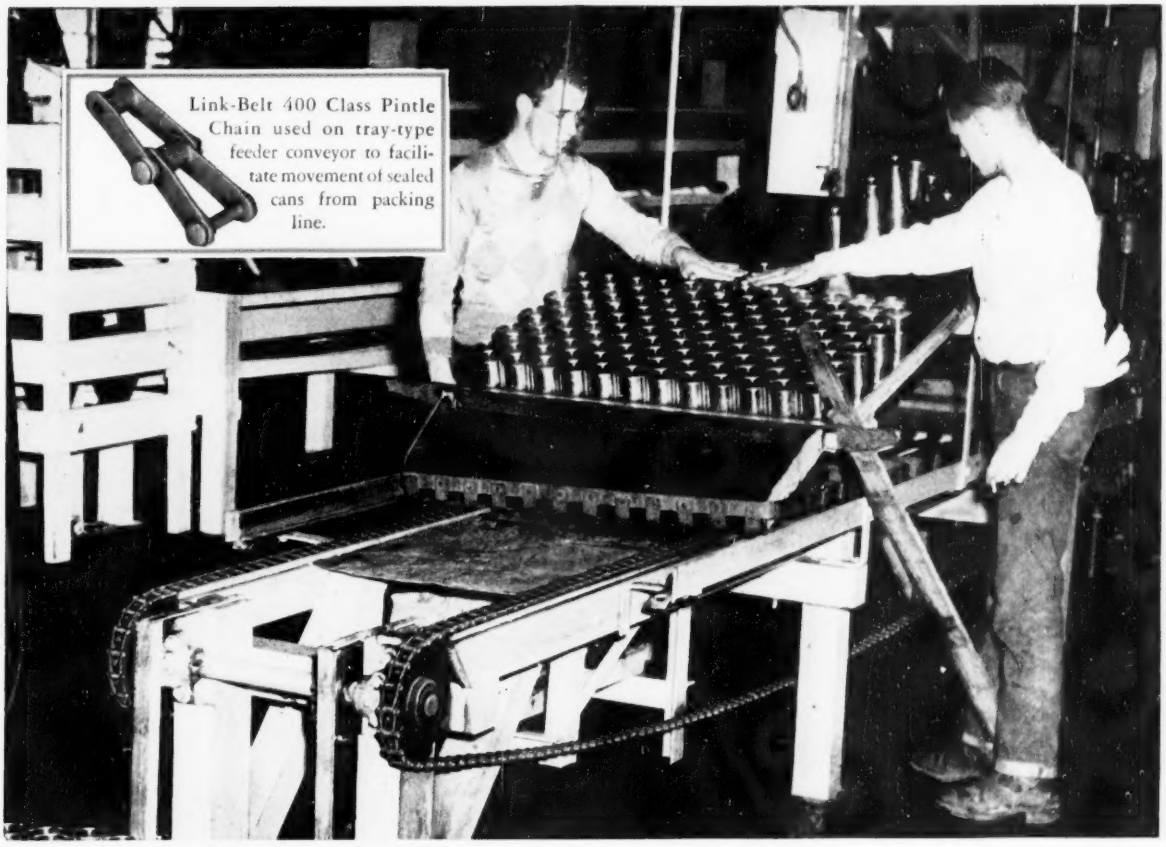
Is there ONE chain that best meets your drive or conveyor problem?



Link-Belt 400 Class Pintle Chain used on tray-type feeder conveyor to facilitate movement of sealed cans from packing line.

You'll find the answer in LINK-BELT's complete chain line... a size and type for every job

The application shown above is an example of how you can select the *one* chain best suited for a particular need from the complete Link-Belt line. And each chain is engineered to provide more efficient service at lower cost than so-called general purpose chain.

Whatever your requirements, you are assured of the *right* chain for the job when you rely on Link-Belt. And, remember—a chain bearing the Link-Belt double ⟩——⟨ arrow is your guarantee of longer chain life.

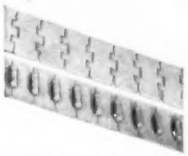
For information on the complete Link-Belt chain line, see the Link-Belt representative near you. He has the answers for efficient, low-cost drive and conveying chain performance.

LINK-BELT

CHAINS AND SPROCKETS

Typical chains from the complete LINK-BELT line

Ewart Detachable Link-Belt—A widely used, popular chain for average or normal-duty service on conveyors, elevators and drives.



S-815 flat top conveyor chain — economical, sturdy, reliable, easy to detach and to keep clean.

Class 1100 Roller Chain —For rolling conveyors and inclined rolling elevators operating under normal conditions.

Class 400 swivel chain —carries cartons, cases, etc. over paths with horizontal turns.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13,181-D

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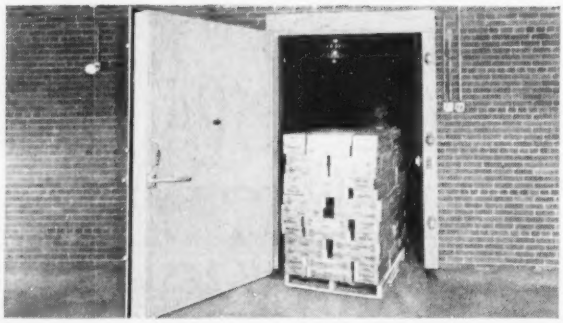
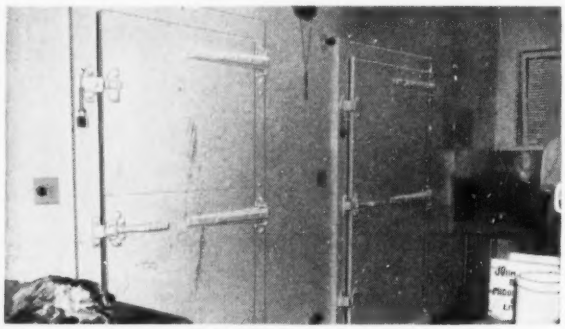
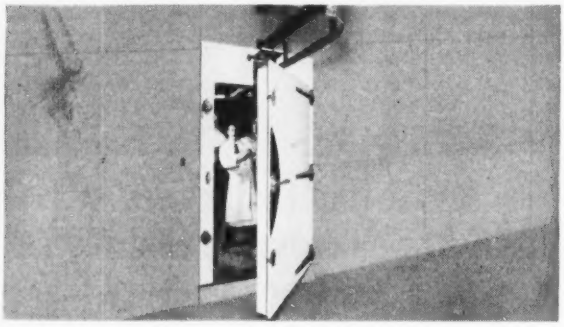


COLD STORAGE WAREHOUSE—Monopanel construction increases the rigidity 6 times and the strength 7 times. Box girder construction guarantees against any possible warping to keep a tight seal.



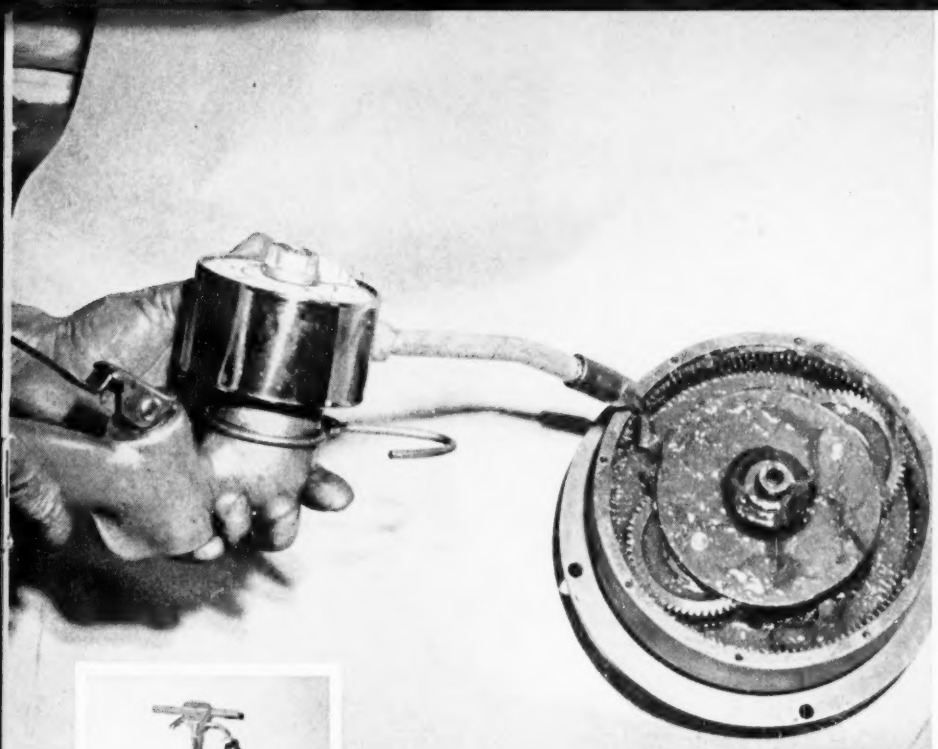
RESTAURANT—Boat Hull plywood backed with asphalt coating provides maximum possible Vapor Barrier. Keeps any moisture from kitchen operations from entering into refrigerated space.



SUPERMARKET—Rugged Two-Point Fasteners assure uniform gasket pressure all around. Door opening and closing with little effort.

MEAT PACKING PLANT—Dirt and bacteria cannot lodge on smooth one piece panels—result improved sanitation. No possibility of bacteria or fungus growth.

For dimensions and specifications of the Series "50" Door ask for Catalog Section 3. Jamison Cold Storage Door Company, Hagerstown, Md., U. S. A.



Solves leakage problem . . .

● Multi-clean Products, Inc., St. Paul, Minnesota, manufactures industrial floor polishing and scrubbing machines. The machines are shipped with grease already installed in gear reduction units. The problem faced by this company was one of finding a grease that would stand up under hard service and not leak from the gear units. Greases tried either caused or threatened leakage troubles.

Called in on this problem, a Standard Oil lubrication specialist recommended STANOBAR Grease "S", a highly stable grease with a unique adhesive characteristic. Given an accelerated service test, STANOBAR did not leak from the gear unit, and its consistency showed no change that would later cause a leakage problem. There was no wear of gears or bearings. Adopted for use in the units, STANOBAR has solved this company's lubrication problem on every count. Officials have been able to eliminate the costly and troublesome practice of having all units returned to the factory, at 12 months intervals, to be repacked with grease.

STANOBAR
TRADE MARK
Grease

The same lubricating qualities of STANOBAR that solved this problem for Multi-clean Products, Inc. can serve you in a wide variety of applications. A Standard Oil lubrication specialist will be glad to discuss those applications with you. He's right there in your section of the Midwest. You need only phone your local Standard Oil office. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

C. L. Daub is the Standard Oil lubrication specialist who helped Multi-clean Products, Inc. solve an important lubrication problem through his recommendation of STANOBAR Grease.

Like all Standard Oil lubrication specialists, he has a broad background of practical experience plus thorough training in Standard's own schools. And like all lubrication specialists, his on-the-job assistance is always available to the industries in the immediate area he serves. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest. Call for the services of your Standard Oil lubrication specialist today. When he stops at your plant, be sure to get information on these outstanding products:

STANOIL Industrial Oils—This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One of two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUST form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specially developed for its intended use. The grades range from a fingerprint remover to a heavy semi-solid that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY

STANDARD

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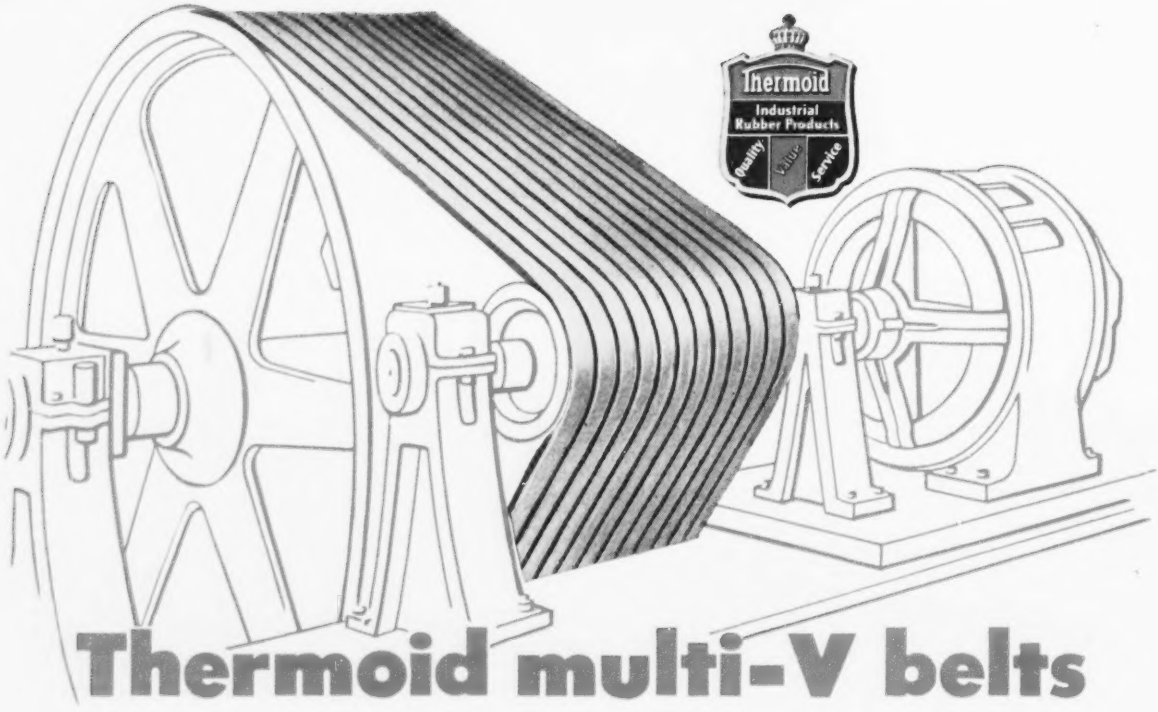


Thermoid multi-V belts

pre-stretched for non-slip performance

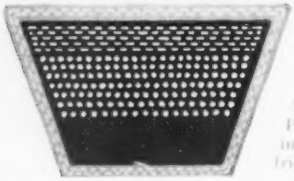
When you use Thermoid *Pre-stretched* Multi-V Belts, you can be sure of maximum power transmission, economical non-slip performance and extra long belt life.

Thermoid Multi-V Belts withstand moisture, abrasion and repeated shock loads.

They're built to take it—specially designed to resist internal friction and heat.

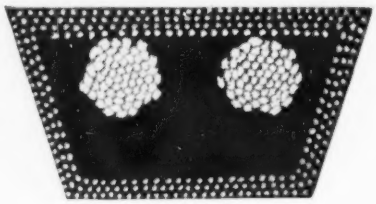
Your Thermoid Distributor can help you with power transmission problems, whether you use Multi-V, F.H.P. or Flat Transmission Belts.

It pays to specify Thermoid.



Thermoid D and E Sections
Grommet type construction assures lower permanent stretch, greater flexing ability and shock absorption.

Thermoid A, B and C Sections
Plied cord construction, latex impregnated to reduce internal friction and heat build up.



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This high purity solvent is more economical for an extremely wide range of flavoring raw materials

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Many manufacturers of food colors for both bulk and household use have improved their products with propylene glycol . . . with only slight alterations in basic formulations. Emulsified flavors, too, benefit from the wetting action of propylene glycol, which increases the stability of the emulsions.

To aid you in evaluating Dow propylene glycol, U.S.P., as a replacement for other more expensive and less effective solvents, we will be glad to send you a free sample and further information. Send your request to THE DOW CHEMICAL COMPANY, Midland, Michigan. *Dept. OC-3-28.*

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DOW

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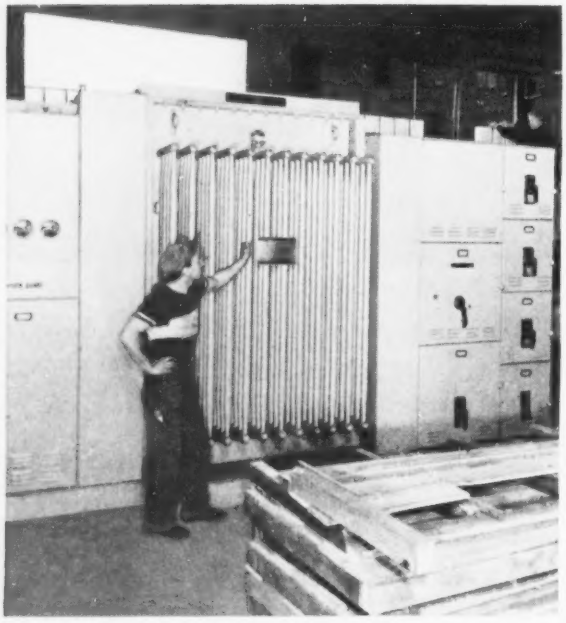
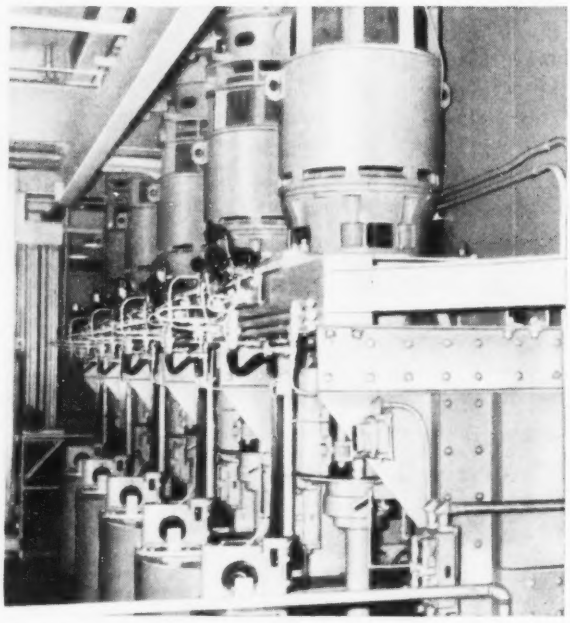
MASTER PLAN for National Sugar's new a-c power distribution system at Philadelphia was developed by this engineering team. Left to right: Frank LeCompte, Construction Engineer; Joseph Harrison, Electrical Engineer; Newton Smith, Plant Engineer; Lloyd Johnson, G-E Sales Engineer. Plan served as guide to flexible system that will simplify plant expansion.

Planned step-by-step modernization

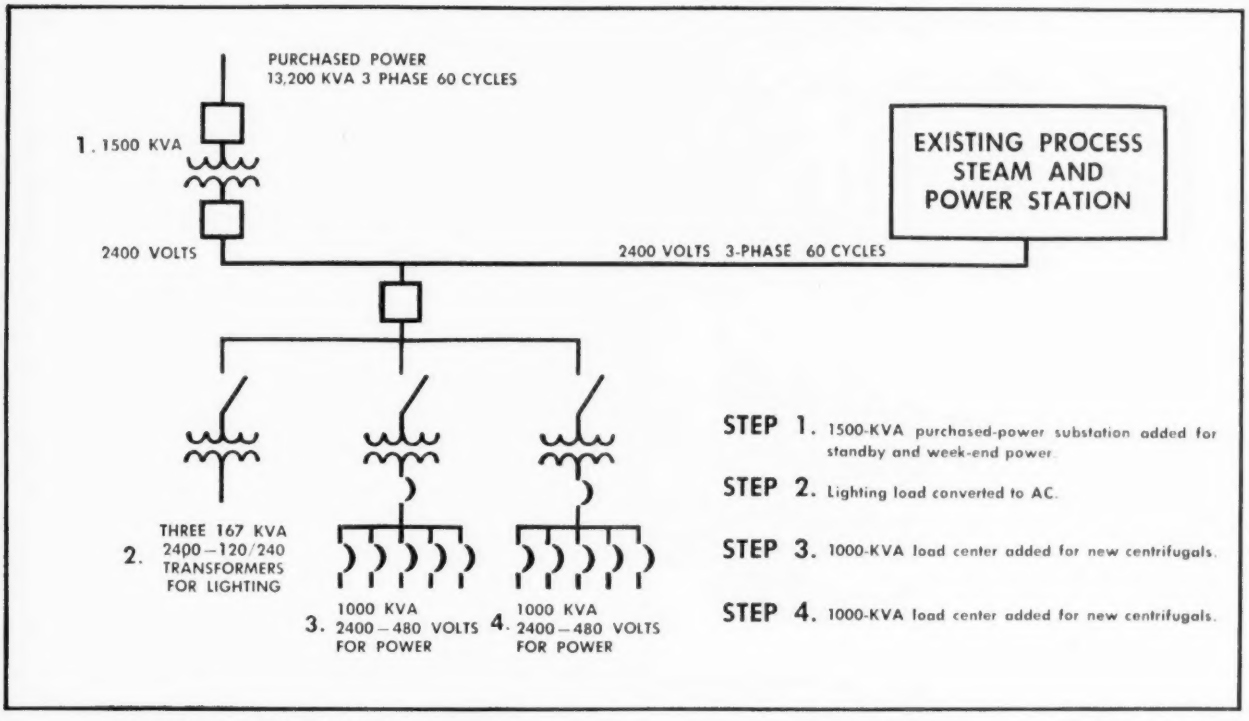


VOLTAGE IS STEPPED DOWN FOR CENTRIFUGALS by this G-E load-center substation. As future expansion takes place, others will be located in load areas throughout the plant.



MOTORS, CONTROL COST LESS—National Sugar's Pennsylvania Division modernized with automatic a-c driven centrifugals like these—cut installation costs, simplified controls.

For more information, use coupon on page 159.


PURCHASED POWER
13,200 KVA 3 PHASE 60 CYCLES
1. 1500 KVA
2400 VOLTS
EXISTING PROCESS STEAM AND POWER STATION
2400 VOLTS 3-PHASE 60 CYCLES
2. THREE 167 KVA 2400–120/240 TRANSFORMERS FOR LIGHTING
3. 1000 KVA 2400–480 VOLTS FOR POWER
4. 1000 KVA 2400–480 VOLTS FOR POWER
STEP 1. 1500-KVA purchased-power substation added for standby and week-end power.
STEP 2. Lighting load converted to AC.
STEP 3. 1000-KVA load center added for new centrifugals.
STEP 4. 1000-KVA load center added for new centrifugals.

SUGAR PRODUCTION WAS UNINTERRUPTED while the National Sugar Refining Company—producers of Jack Frost, Quaker, and Arbuckle's Sugar—carried out step-by-step power system expansion. Load-center substations, heart of new plan, make expansion easy—keep cost at minimum. Savings in cable, and a-c drives, have more than paid for system.

pays off at National Sugar Refining

Long-range system planning results in area-by-area modernization of both process and electrical systems at minimum investment

If your electrical distribution system can't take care of expanding production—and if complete modernization at one time would interfere with production and be uneconomical—then you'll be interested in the way the Pennsylvania Sugar Division of the National Sugar Refining Company solved this problem.

System *planning* was their key. G-E application engineers worked with Mr. Frank LeCompte, Construction & Development Engineer at National Sugar's Pennsylvania Division. Together, they designed a master a-c distribution system that was geared to the present system—and would accommodate future plant growth at minimum cost.

Then National Sugar put this master plan into action. The new a-c distribution system was purchased and installed section by section as processing facilities were modernized and expanded. This new system paid its way in savings in equipment, materials, and installation costs.

Reductions in original costs and capitalized operating expenses of ten new centrifugals, effected by using a-c instead of d-c drives, equalled the price of two new G-E load-center unit substations and several units of 2300-V switchgear. A 1500-KVA substation, operating from purchased power, quickly justified itself in meeting emergency standby requirements and in furnishing power on weekends.

General Electric application engineers can help you save the same way with a new power distribution system. Contact your nearby Apparatus Sales Office early in your planning. General Electric Co., Schenectady 5, N. Y. 652-13

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

Engineered Electrical Systems for Food Processing Plants

GENERAL ELECTRIC

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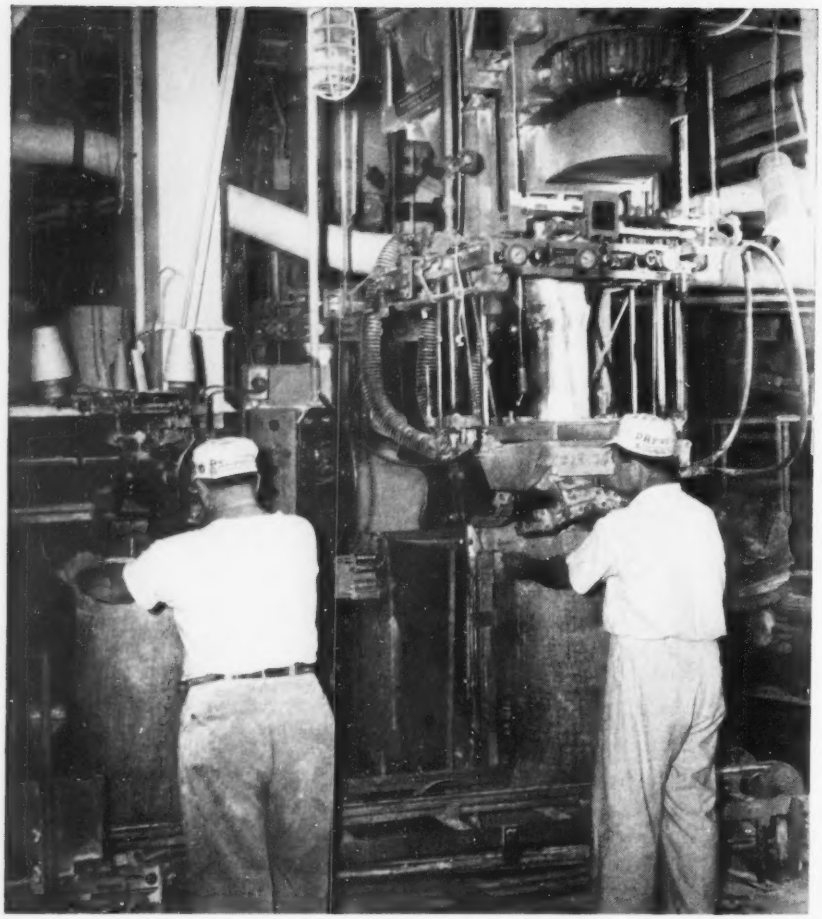


...RICHARDSON PACKERS SAVE DOUGH for

PROBLEM: ✓

High-speed and accurate production weighing of 50- to 100-lb. quantities of flour and packing them evenly in both fabric and paper bags.

SOLUTION: ✓

Installation of a number of Richardson Automatic Flour Packers, each consisting of a Richardson Screw-Type Feeder, GGG-38 Automatic Flour Scale and G-23 Auger-Type Packer. Their adaptability to textile and economical open-mouth, multiwall paper bags has effected considerable savings in bagging cost. And the automatic interaction of all units has lowered labor requirements and maintained consistent ACCURACY BY WEIGHT.

General Mills, producers of Gold Medal and many other fine flours, had a hard time packing their production volume. Flour, by nature, does not easily settle, and must be forced into bags. Many packing and bagging systems were tried, but none compared with the Richardson Flour Packer for this application. None could match the bagging versatility and even packing at a rate up to 6 bags per minute—and still give the same *consistently accurate weight.*

Richardson has specialized in materials handling by weight for over fifty years—designing and building systems that solved weighing and bagging problems in every branch of the process industries.

Your methods, too, may benefit greatly from Richardson engineering. We'll gladly survey your installation, at no obligation, and a Richardson engineer will show you the right road to more profitable operation.

Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

Richardson Scale Co., Clifton, New Jersey. Automatic Weigher Systems of All Types: Automatic Bulk Weighing Hopper Scales, Including Conveyor-Feed Types • Continuous Feeder-Weighers • Automatic Bagging Scales • Bag Sewing Conveyors Packers • Multi-Material Proportioning • Process Control Panels. *Branch offices in:* Atlanta • Boston • Buffalo • Chicago • Detroit Houston • Minneapolis • New York • Omaha • Philadelphia Pittsburgh • San Francisco • Wichita • Montreal • Toronto.

Containers that KEEP the BEST ...in YOUR BEST

Sturdy steel drums and pails—made with care and accuracy in every detail—provide dependable protection for the best sales assets of your products. They make certain that the qualities that have been sold to your customers remain safely sealed.

That's why J&L Steel Drums and Pails are standard packaging specifications for many leading product brands. They have proved through years of dependable service that they meet the most rigid tests for durability.

Plants for the manufacture of J&L Steel Drums and Pails are located in leading industrial centers to assure quick, efficient service to meet your requirements. Call the nearest J&L office . . . or, contact our headquarters office in New York City.

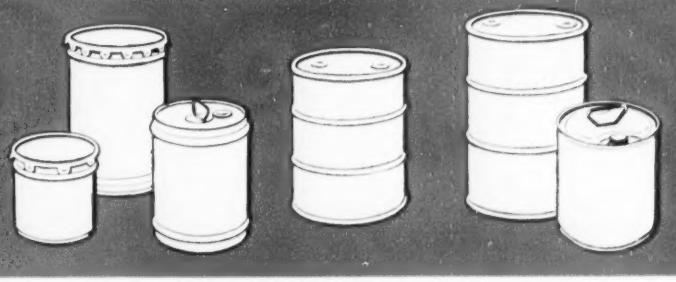
JONES & LAUGHLIN STEEL CORPORATION
Container Division
CHRYSLER BUILDING • NEW YORK 17, N. Y.

PLANTS: Bayonne, N.J. . . . Cleveland, Ohio . . . Philadelphia, Pa. . . . New Orleans, La. . . . Kansas City, Kan. . . . Atlanta, Ga. . . . West Port Arthur, Texas . . . Toledo, Ohio

J&L STEEL

The J&L Line includes all types of Closures and Finishes. Bright, colorful decorations may be reproduced to your specifications.

• Heavy-duty ICC Drums • Light-gauge Drums • 55, 30 and 15 gal. capacity and 100-lb. Grease Drums • Lightweight Drums for Chemical and Powdered Materials • 1-10 gal. capacity Steel Pails for Foods, Chemicals, Oils



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"Keep SLACK out of your line!"

. . . a Vital Rule in Fishing

The first thing a fisherman must learn is to keep his line taut after a strike. Any bit of slack gives the fish a chance to shake off the hook. It's the main reason why those big ones get away!

. . . and for Efficient Production

Slack in a packing line is always costly. But it's avoidable, if the cause is delay in receiving containers or closures. For quick, sure deliveries always remember—"It's just a short haul from BALL!" Our conveniently located plants have the capacity and skill to serve you best. On any glass or metal screw cap needs, call BALL first of all!

CALL BALL for Stock or Special Mold Containers in all popular styles and sizes . . . Plain or Lithographed Metal Screw Caps, 24 to 120 mm . . . Engineering assistance on ANY container, closure or packaging problem.

BALL BROTHERS COMPANY
Muncie, Indiana

Closure Division: The Aridor Company
3428 W. 48th Place, Chicago 32, Ill.

Factories at Muncie; Chicago; Hillsboro, Ill.; Okmulgee, Okla.; El Monte, Calif.

OFFICES IN ALL PRINCIPAL CITIES

It's Just a Short Haul from **Ball** for Containers and Closures of Quality

Tested patterns to meet today's needs . . .

Jenkins cast steel Valves

for dependable economy

in high pressure

—higher temperature services

Mounting pressures and temperatures in power generation and industrial processing call for Cast Steel Valves. For this increasing need, Jenkins offers a wide selection of patterns that have met the test of the toughest services throughout industry.

In these valves, Jenkins provides a wide margin of strength and safety beyond ratings. Special refinements in design extend their service life, assure long, trouble-free performance. Efficiency and low maintenance records measure up to the high standards established for all valves developed by Jenkins Valve *specialists.*

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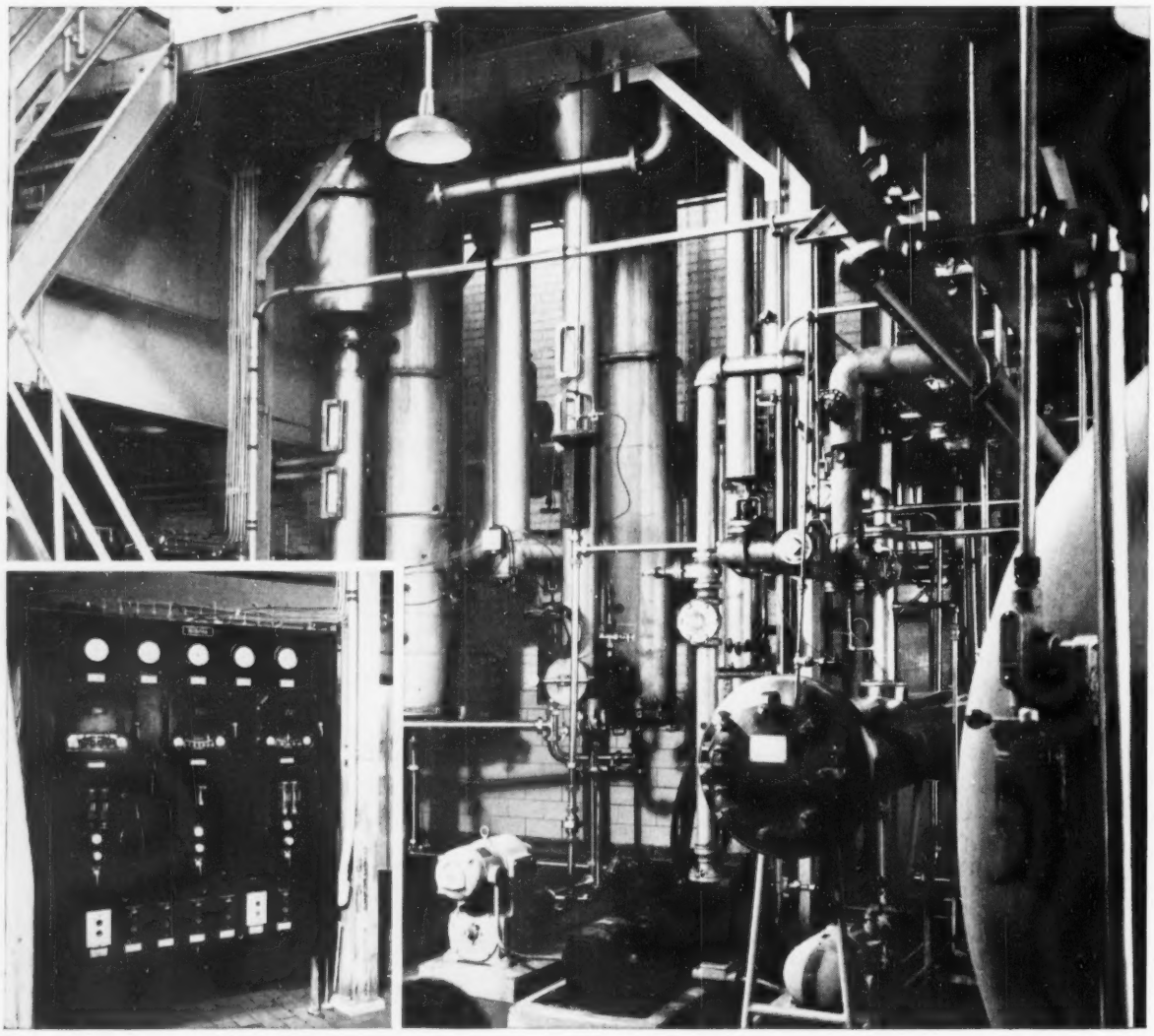
TAYLOR HELPS WITH CONTINUOUS



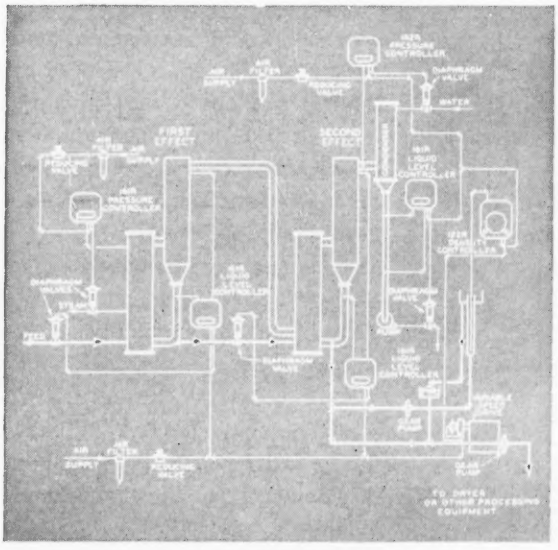
Right: Buffovak Double Effect Evaporator in use at Dodds Alderney Dairy Inc., Buffalo, N. Y.
Left: Panel Board for Taylor Continuous Evaporator Control System.

For more information, use coupon on page 159.

YOU CONCENTRATE

EVAPORATOR CONTROL

ONE of the most expensive processes between the cow and the consumer is concentration, in the case of evaporated milk products. Taylor's Continuous Evaporator Control System *reduces* concentration costs by controlling three major variables — *absolute pressure, product level* and *steam pressure.* You can obtain the maximum capacity, the highest quality of product and the greatest recovery of solids through use of this system. On the Buflovak Double Effect Evaporator shown here, in use at Dodds Alderney Dairy Inc., Buffalo, N.Y., all Taylor Instruments work together in close coordination to assure a premium product at low cost.



1. Absolute Pressure Controller gives uniform pressure within the second effect by automatically regulating water flow to the condenser, so only needed amount of water is used. Holds constant boiling temperature, cuts down entrainment by reducing sudden pressure decreases.

2. Steam Pressure Controller automatically regulates pressure to first effect heater, preventing steam pressure fluctuations. Gives smoother operation by maintaining constant steam supply.

3. Level Controller on each effect precisely regulates feed so that proper product level is always assured. Result—maximum efficiency of heating surface, much less entrainment and burn-on. Ask your dairy equipment supplier for details of this money saving system, or write for **Catalog 500A.** Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

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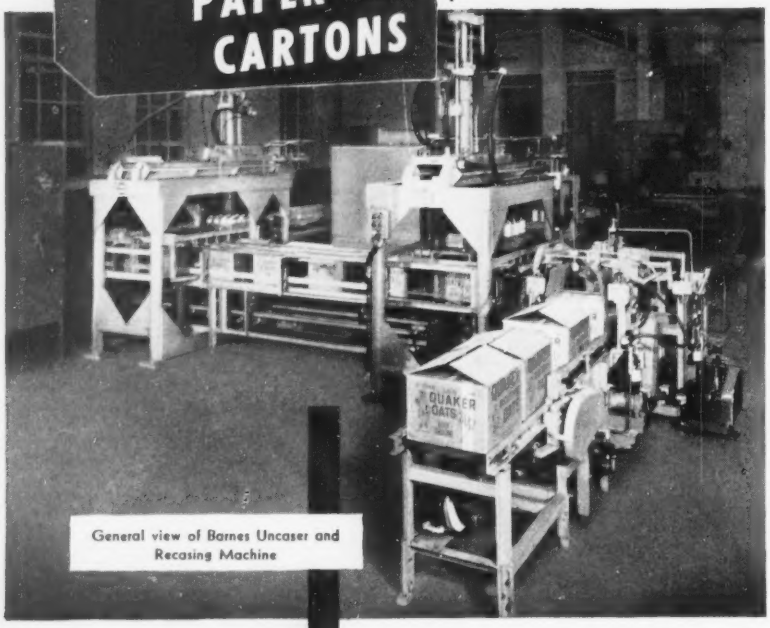
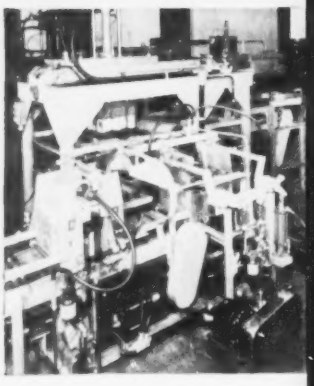
IF YOU USE PAPER CARTONS

Investigate This Barnes Uncaser and Recasing Machine



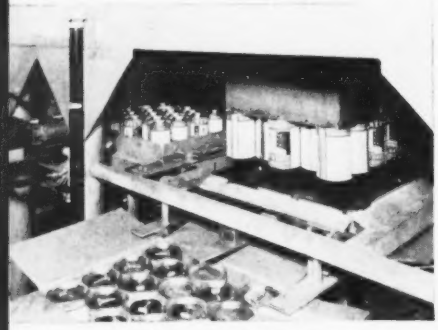
General view of Barnes Uncaser and Recasing Machine

This new magnetic Uncasing and Recasing machine unloads and reloads 200 cartons per hour. Each carton holds 36 cans. Paper cartons of empty cans are conveyed to the flap opening station where one pair and then the other pair of flaps are opened by vacuum lifters. The carton is then transferred to position under a rectangular magnet which lifts the cans out onto a belt conveyor. There are two layers of cans in a carton so the magnet operates twice for each carton.



View showing vacuum lifters

The belt conveyor moves the cans to an "unscrambler" which delivers them single-file to the filler. After filling, the cans are conveyed back to the machine for recasing.



Detailed view of reloading station

FREE ADDITIONAL DATA on this and other Barnes Processing equipment is available upon request. Ask for bulletin E-553.

W. F. & JOHN BARNES

W. F. and JOHN BARNES

PROCESS EQUIPMENT DIVISION 303 SOUTH WATER STREET, ROCKFORD, ILLINOIS

(ADVERTISEMENT)

ASEPTIC CANNING CREAM STYLE CORN

The Martin Aseptic Canning System offers a means of eliminating the processing in the can by taking advantage of short-time high-temperature sterilization of the product in a closed heat exchange system and filling it cold into a sterile can.

CORN PROCESSED OUTSIDE OF CANS

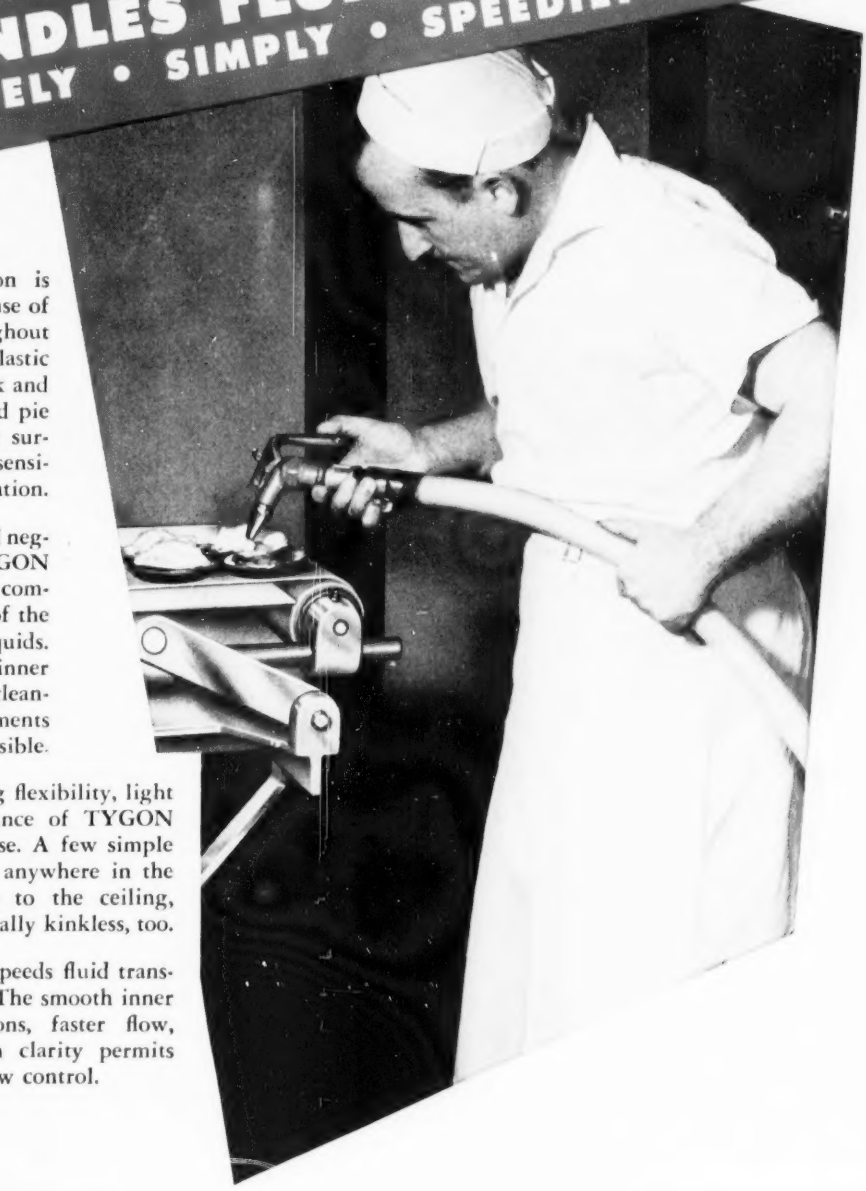
Attractive features of the Martin System include continuous straight-line flow of both the product and the cans, low utility requirements, small space requirements, low manpower costs, and improved flavor, color and quality in the finished product. One feature of particular interest is the fact that because the corn was processed outside of the can, the finished canned product has identical quality regardless of size of container used.

CARMELIZED TINT ELIMINATED

Test cuttings of the Aseptic pack show that the product produced by this method has a vast improvement in color by eliminating the characteristic brown or carmelized tint found in present in-the-can processed cream style corn.

Two papers were delivered at the Canning Machinery & Supplies Association Convention recently. These papers offer additional information on Aseptic Canning and are available upon request. Write to W. F. and John Barnes Company, 301 South Water Street, Rockford, Illinois.

HANDLES FLUID FOODS
SAFELY • SIMPLY • SPEEDILY



No "cream-puff" application is Wagner Baking Company's use of TYGON TUBING. Throughout their plant, this glass clear, plastic "pipe" is used to convey milk and egg mixtures, pie fillings, and pie toppings. Some of these are surprisingly corrosive — all are sensitive to the slightest contamination.

SAFETY: The non-toxicity and negligible extractibility of TYGON Beverage TUBING insures complete safety in the handling of the most sensitive foods or liquids. The permanently glass-like inner surface guarantees complete cleaning. Both bactericidal treatments or steam sterilizations are possible.

SIMPLICITY: The long-lasting flexibility, light weight and abrasion resistance of TYGON TUBING make it easy to use. A few simple connections and you can go anywhere in the plant — around corners, up to the ceiling, down to the floor. It's practically kinkless, too.

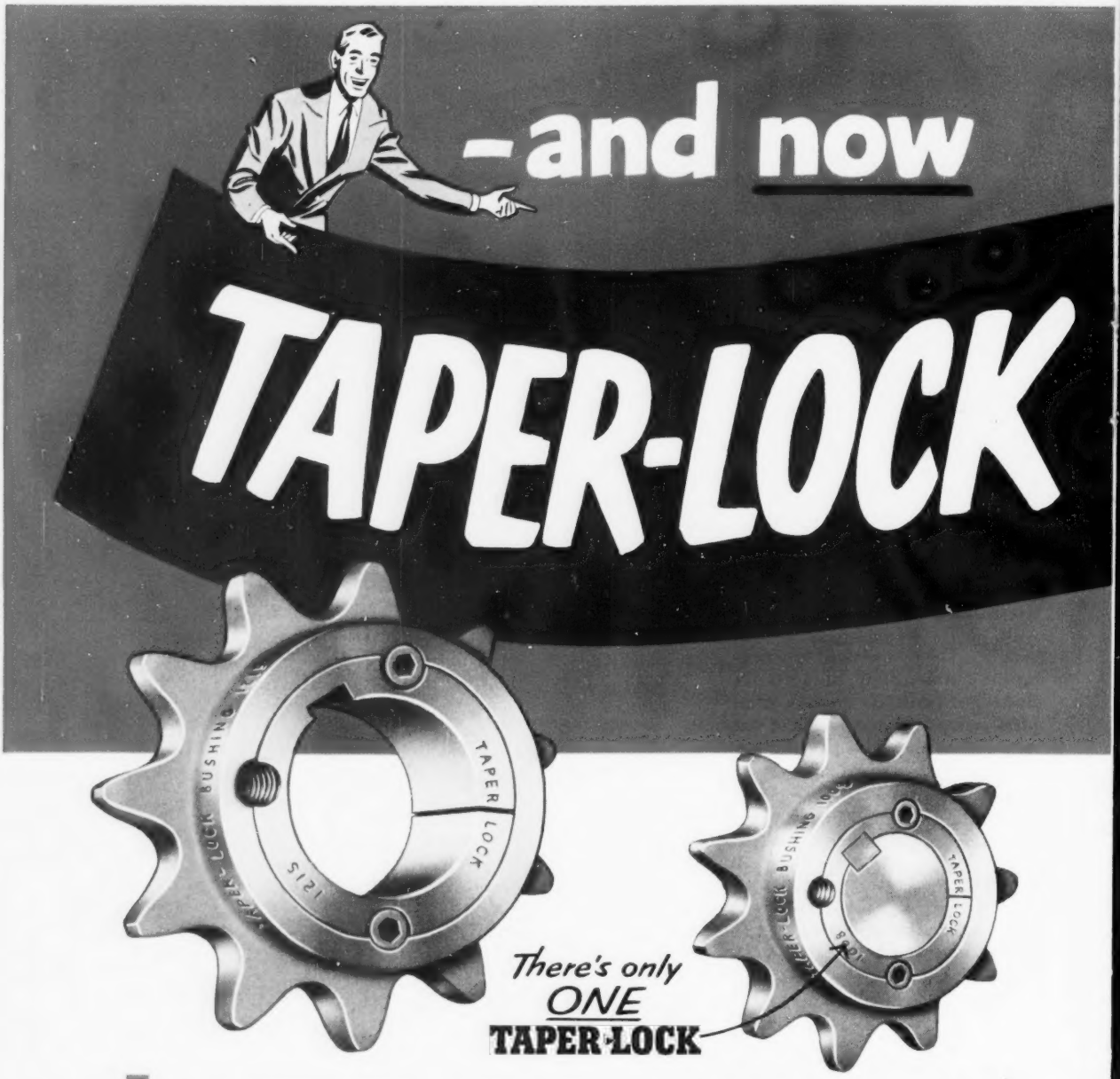
SPEED: TYGON TUBING speeds fluid transmission from start to finish. The smooth inner wall gives easier connections, faster flow, quicker cleaning. The high clarity permits rapid inspection — better flow control.

TYGON
flexible plastic
TUBING

TYGON TUBING is made in standard or specially sized bores up to 2" ID. Outer braid reinforcement is also available for pressure applications. Write, today, for the free Bulletin T-77 containing complete technical information. Address U. S. STONEWARE, Akron 9, Ohio.

146C

For more information, use coupon on page 159.



FROM the package to the shaft — ready, *immediately,* for the job! This is the new "off-the-shelf" availability which Dodge brings to roller chain drives. And, with this new availability, you get the important advantages of the famous Taper-Lock principle, proved in millions of V-belt installations.

No more costly and time-consuming boring of sprockets to fit your shafts! *Taper-Lock bushings are available in a range of sizes for the great majority of industrial applications.* And it's not necessary that shafts be turned and ground to get a tight fit. *Taper-Lock not only is keyed to the shaft, but grips it with the firmness of a shrunk-on fit.* Yet when a sprocket is to be replaced, it comes off easily, quickly. The bushing may be re-used.

Taper-Lock sprockets are compact. They have no flange, and no protruding parts. Taper-Lock occupies no more space on the shaft than standard sprockets. The flush design means safety.

The new Dodge line of roller chain is made to highest quality standards, by craftsmen who know chain manufacture. Both chain and sprockets are made to ASA standards. Taper-Lock sprockets will take any make of American standard chain.

Taper-Lock sprockets will be carried in Distributors' stocks for immediate delivery, in a complete range of B-type steel sprockets—½" to 1¼" pitch. The range in ⅝" pitch, for example, is 12 to 112 teeth.

All bushings and the smaller sizes of sprockets are packaged individually. Dodge roller chain is packaged in 10-foot lengths — and can be furnished in 50-foot and 100-foot reels.

For detailed information about Taper-Lock sprockets and Dodge chain drives write now for Bulletin A-624.

DODGE MANUFACTURING CORPORATION, 2800 Union St., Mishawaka, Indiana

SPROCKETS

-and DODGE ROLLER CHAIN

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory-trained by Dodge, he can give you news of cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified phone book.

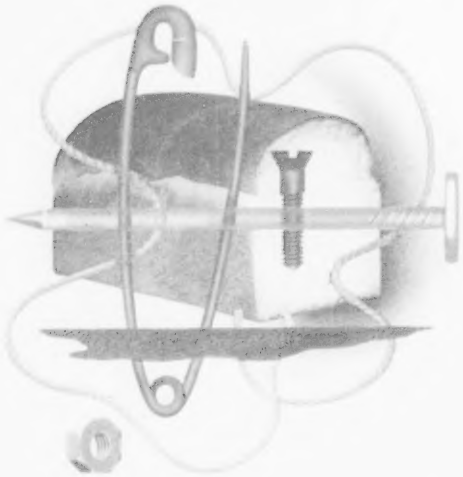
DODGE

of Mishawaka, Ind.

For more information, use coupon on page 159.

YOUR REPUTATION...

on trial 365 days a year



Each day, with each dough, your reputation is at stake. Complete freedom from foreign material in the finished product is an important factor in assuring that reputation. Your method of handling your ingredients other than flour can provide you with protection—or leave the way open to non-uniformity or irregularity. The Ingrediator method gives you positive assurance; saves you time and money, too.

Into every loaf of bread goes one priceless ingredient . . . *the reputation of its baker.*

The Readco Ingrediator safeguards that reputation by protecting production against uneven texture, lack of uniformity, *and undesirable foreign matter.*

It quickly and thoroughly emulsifies all water and small ingredients . . . providing the fine, even distribution of ingredients that results in consistent, evenly textured loaves.

It pumps emulsified ingredients through a highly effective stainless steel filter which removes foreign particles and it delivers these ingredients to any one of your mixers.

You eliminate the use of batch cans, minimize small ingredient handling, and increase your mixing room efficiency with a *Readco Ingrediator.*

All food production zones are entirely of sanitary stainless steel construction, quickly disassembled for cleaning. *Write or call your regional Readco Representative, or the Read Standard Corporation.*

READ STANDARD
CORPORATION

BAKERY-CHEMICAL DIVISION: York, Pennsylvania · Los Angeles 39, California

For more information, use coupon on page 159.

Satisfaction rests on the carton

Schlitz is a dependably-good favorite in millions of homes. Dealers welcome this fast-selling beer too. It is attractively packaged, strongly promoted, securely delivered.

Retail sales clerks are stacking displays of Schlitz today—by the bottle, can and carton. UNION is among the major suppliers of corrugated shipping containers for Schlitz.

Union cartons deliver the goods safely, do an effective merchandising job as well.

UNION

INTEGRATED PLANNING · TWIN INTEGRATION · INTEGRATED PRODUCTION

UNION BAG & PAPER CORPORATION

CORRUGATED CONTAINER DIVISION • Box Plants: Savannah, Ga., Trenton, N. J., Chicago, Ill.

Eastern Division Sales Offices: 1400 E. State St., Trenton 9, N. J. • Southern Division Sales Offices: P.O. Box 570, Savannah, Ga.
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The most modern flavor development

VANITROPE*

the new vanilla-like flavoring agent

Better Quality

Savings up to 50%

Intensifies all flavors

IN CHOCOLATE — adds richness and stretches the flavor

IN CONFECTIONS — boosts fruit flavors

IN IMITATION VANILLA — makes it taste like a rich, true extract

IN BAKING — shows unmatched stability at high oven temperatures

IN ICE CREAM — as flavoring ingredient improves quality yet cuts costs

Vanitrope, a recent exclusive development, is one of several important discoveries achieved under the auspices of Shulton's extensive Research and Development Program.

If you so desire, our Technical Service will show you how Vanitrope can heighten your product's flavor — and save you money!

Samples and brochures with complete technical data available on request.

**Registered name for propenyl guaethol*

ANOTHER CONTRIBUTION FROM

SHULTON Inc.

FINE CHEMICALS DIVISION • 630 FIFTH AVENUE, NEW YORK 20, N. Y.

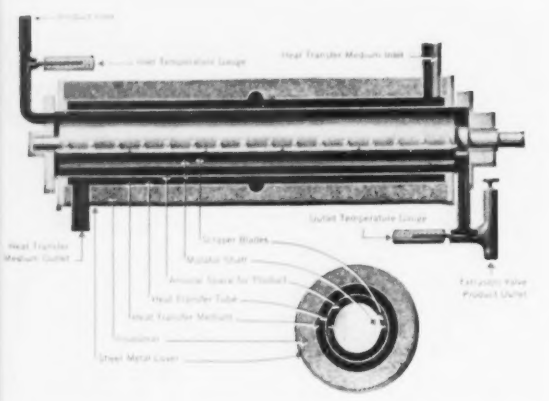
For more information, use coupon on page 159.

Another product improved and produced at lower cost

Votator®

CONTINUOUS PROCESSING APPARATUS

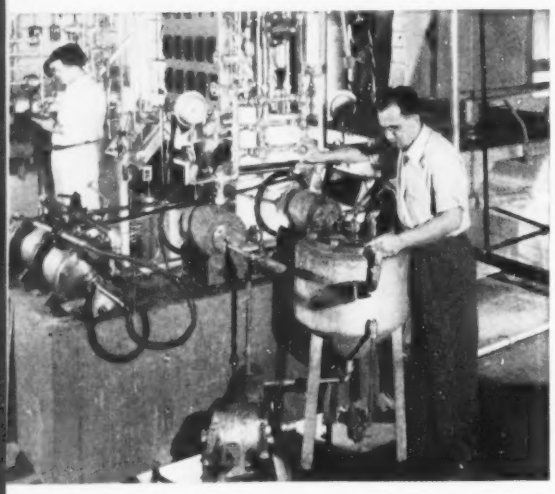
Continuous processing improves the product



Heart of the Continuous Processing System

The VOTATOR Heat Transfer mechanism is the most effective application of basic heat-transfer theory yet devised. It processes maximum volume of material per unit area of heat-transfer surface.

The material to be processed is pumped through a narrow, annular passage, is heated or cooled in seconds through contact with the heat-transfer tube. Revolving scraper blades maintain a clean heat-transfer surface and provide simultaneous agitation and mixing. The completely enclosed system provides greater protection against contamination than otherwise possible.



Girdler's Broad Process Experience

Outstanding Girdler chemists and engineers in the fields of food technology and oil processing have developed distinctive processes and apparatus for many applications in the food industry. Use Girdler's broad experience to improve *your* products and production efficiency.

VOTATOR* Continuous Processing Apparatus cooks starch jelly with exact, automatic control of moisture content

TO THE CHARMS COMPANY, Bloomfield, N. J., goes the distinction of being the first to put into commercial operation a new process for cooking starch jellies continuously. Their pioneering has rewarded them with a vastly improved quality and uniformity of their confection, and with drastic reduction of costs. The process was developed by engineers of The Girdler Corporation, with the technical assistance of National Starch Products Inc., a company with wide experience in new starch developments.

Basic Advantage: Eliminates Excess Water. With the old open kettle method, excess water (in the amount of 60 pounds for 100 pounds of finished confection) had to be evaporated by boiling and the starch jelly had to be dried in hot rooms for several days after molding. With the new enclosed system, the VOTATOR heat exchange apparatus cooks the starch in seconds with exactly the right amount of moisture required for the finished jelly.

Improves Quality. The finished product has greater clarity, is free of caramelization and does not have the conventional hard skin. Precise control assures uniformity.

Other advantages include fuel savings of about $45.00 per day, reduction of starch tray inventory of 60 to 75%, less maintenance and handling costs, a saving of 65% in floor space, reduced rejects and improved working conditions. See the comparative table on opposite page.

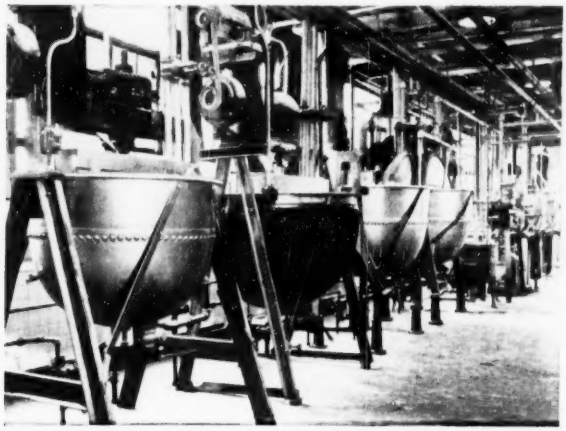
What's YOUR problem?

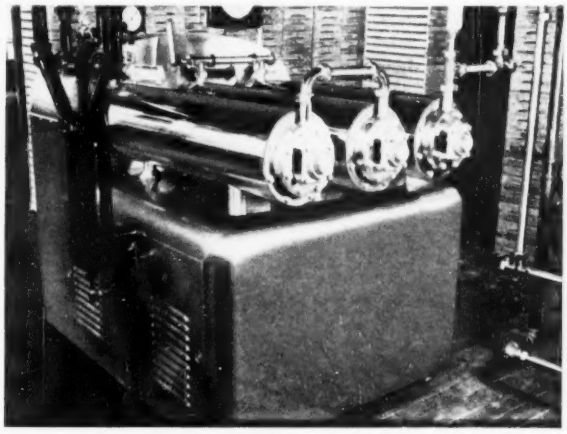
Continuous processing with VOTATOR Heat Transfer Apparatus is providing similar benefits in the production of a wide variety of products in the food industry. This compact, closed processing system with fully automatic control of temperature, pressure and mixing asssures uniform quality, strict cleanliness and outstanding production efficiency.

Girdler's research and development department is well equipped to assist you in applying continuous processing to *your* production. Call on Girdler for complete process design, engineering and construction service.

*VOTATOR - Trade Mark Reg. U. S. Pat. Off.

and cuts costs drastically at Charms Company





COMPARISON OF METHODS

FORMER OPEN-KETTLE METHOD

1. Requires 60 lbs. of water per 100 lbs. of product in excess of water content of finished product to achieve starch gelation in a high sugar slurry. This excess water must be removed by evaporative cooking, and absorption by molding starch.

2. Cooking skill required to control quality of product. Variations in heat, agitation, time, and additions of ingredients affect gel characteristics, moisture retaining properties, clarity, viscosity, eating quality and shelf life.

3. Batches of 800-1000 lbs. require 55 to 65 minutes per kettle batch. Batches must be cooked ahead of the depositing machines to keep up uninterrupted flow. 7 steam jacketed kettles, suspension tanks, pumps and auxiliary equipment required.

4. Requires 2 to 4 days setting time of cast starch jellies. Air conditioned, heated drying rooms needed.

5. Needs 3 skilled men to cook starch jellies in kettles for normal output. Men must start work one hour in advance of regular daily starting time.

6. Shutdowns or breakdowns of depositing equipment causes spoiled or non-uniform batches held overlong in heated kettles.

7. Requires large inventory of molding starch and molding trays because of long drying time. Large plant areas needed. Additional handling is costly.

8. Thorough drying of molding starch required to absorb excess moisture in cast jelly. Requires heat and creates explosion hazard.

9. Clarity of finished jellies is impaired due to inclusion of air in kettle cooking.

NEW CONTINUOUS METHOD

1. Eliminates Evaporative Cooking. No excess water required to achieve complete starch gelation of high sugar slurry. No evaporative cooking necessary. Starch jelly is cast into the molds at exactly the right moisture content.

2. Precise Control Assures Uniformity. Automatic control devices reduce human error factor.

3. Increases Output. Up to 4500 lbs. of starch jelly cooked per hour continuously—actual cooking time is 8 to 40 seconds from input to output of heat exchanger equipment.

4. Cuts Setting Time in Half. Only 1 to 1½ days setting time of starch jellies required—hot rooms and air-conditioning eliminated.

5. Reduces Man-Hours. One semi-skilled man needed to operate continuous automatic process. Starts work only a few minutes before normal daily starting time.

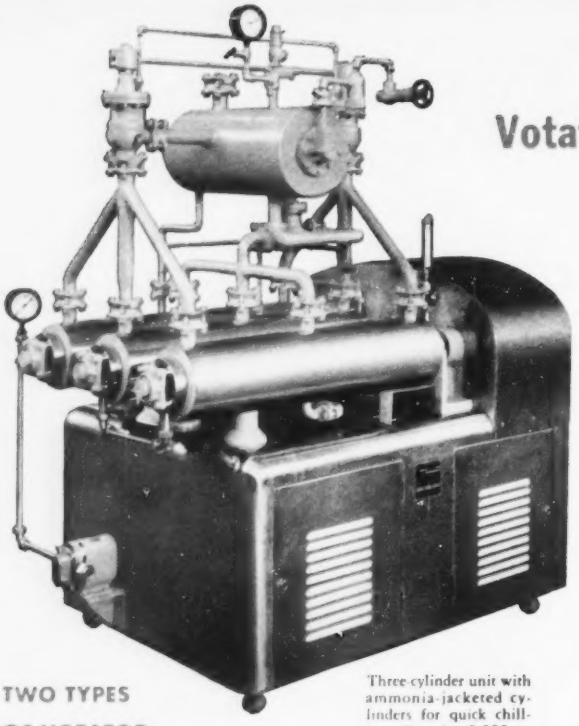
6. Eliminates Waste Due to Shutdown. Shutdowns or breakdowns affect only 60 lbs. of starch jelly in heat exchanger which is diverted back to holding tank.

7. Reduces Inventory and Floor Space Required. Trays and amount of molding starch cut ⅔. Plant space and materials handling substantially reduced.

8. Reduces Drying Cost and Hazard. Molding starch does not have to be thoroughly dry because finished jelly does not have excess moisture. Reduces explosion hazard.

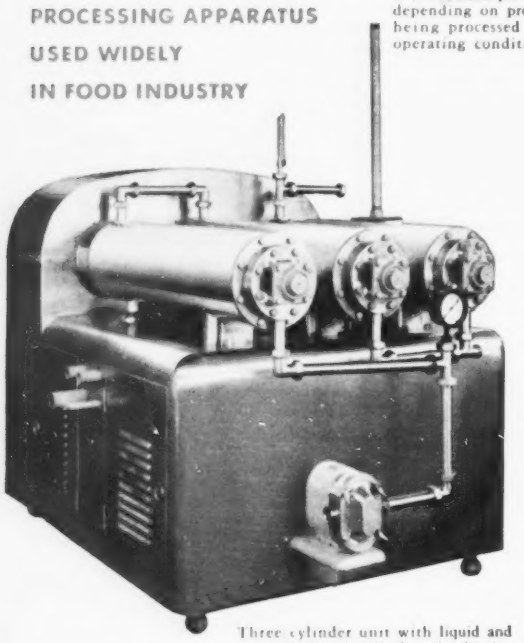
9. Produces Clearer Jellies. Completely enclosed system eliminates air bubbles – improves clarity.

Votator Heat Transfer Apparatus has wide application



Three-cylinder unit with ammonia-jacketed cylinders for quick chilling. Capacity 2,000 to 10,000 pounds per hour, depending on product being processed and operating conditions.

TWO TYPES OF VOTATOR PROCESSING APPARATUS USED WIDELY IN FOOD INDUSTRY



Three-cylinder unit with liquid and vapor-jacketed cylinders for heating and cooling. Capacity 1,000 to 15,000 pounds per hour, depending on product being processed and operating conditions.

Do you have a similar processing operation?

FOOD PRODUCTS	FUNCTION OF VOTATOR APPARATUS
Cream Style Corn	Sterilizing and Cooling
Dog Food	Cooking, Sterilizing and Cooling
Chocolate Milk Drink	Sterilizing and Cooling
Edible Starch (For Salad Dressing)	Cooking and Cooling
Pie Filling	Cooking, Pasteurizing and Cooling
Strained Food	Sterilizing and Cooling
Soup	Sterilizing and Cooling
Lard	Chilling and Plasticizing
Margarine	Continuous Manufacture
Shortening	Chilling and Plasticizing
Sweetened Condensed Milk	Cooling and Crystallizing of Sugars
Invert Syrup	Cooling and Crystallizing of Sugars
Eggs	Pasteurizing and/or Chilling
Concentrates, Fruit Juices and Purees	Slush-Freezing
Juice Concentrates	Enzyme Inactivation, Sterilization, Cooling

GET THE FULL STORY TODAY!

This 32-page book gives you complete information on the application of VOTATOR Heat Transfer Apparatus to food processing. It contains a 12-page technical section with valuable reference data and charts. Write for your free copy today.

THE GIRDLER CORPORATION
224 East Broadway • Louisville 1, Kentucky

Please send booklet describing Continuous Processing.

Name _____

Position _____

Company _____

Address _____

City _____ *State* _____

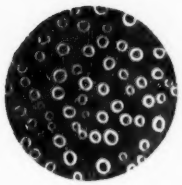
The GIRDLER Corporation

LOUISVILLE 1, KENTUCKY

VOTATOR DIVISION: New York, Atlanta, Chicago, San Francisco

RIGHT IN YOUR OWN BACK YARD... BY WEST
BUGS KNOW IT'S THE KISS OF DEATH WHEN THE WEST MAN TURNS ON THE NEW ATOMIZER
A TWIST OF THE WRIST AND IN TWO MINUTES THIS PLANT WILL LOOK LIKE A LONDON FOG!
WOW! THIS JOB USED TO LOUSE UP THE WEEKEND FOR FIVE MEN. AT DOUBLE TIME!
WEST ATOMIZERS? WOW! WE'RE SITTING DUCKS IN THIS CRACK!
YOU'LL STILL SWING A MOP, THUNDERFOOT. THIS IS A BUG KILLER, NOT A JANITOR!
BET THIS BLOWS MY JOB RIGHT OUT THE WINDOW!
TRAPPED BY VAPOSECTOR! SAME DIRTY TACTICS THAT WIPED OUT OUR COUSINS AT THE CANNERY!
JIGS UP! IT'S THIS OR WEST FUMIGANTS OR WEST RESIDUALS!
WHAT STRATEGY! THEY'VE MAPPED OUT AN INSECT CONTROL PLAN THAT'S STOPPED US COLD!
HEY! WAIT A MINUTE... WHO'S GONNA CARRY US OUT?

Fog 1,000 cu. ft. in 3 seconds for 5¢



Top — Magnified photo of uniform 8 micron droplets produced by precision-machined suction nozzles of West Atomizing equipment. "Dry mist" remains air-borne for prolonged periods.

Bottom — Magnified photo of droplets produced by ordinary hydraulic compressor sprayers. Vary from 2 to 300 microns. Larger droplets fall, wetting floors and reducing effectiveness.

– and with only 1 ounce of Vaposector – for complete control of flying insects. Double this dosage for crawling insects.

Impossible? Not with a permanently installed West Atomizer. 10 suction nozzles atomize a "dry mist" of extra-potent insecticide. Droplets are so small they hang in the air . . . seep into every crack . . . penetrate delicate insect breathing tubes.

It's an unbeatable combination. High potency Vaposector – sprayed with super-efficient West atomizing equipment. One man does the job. There's only one valve to open. You can fog your entire plant simultaneously.

West has a complete line of insecticides and atomizing equipment ranging from permanent installations to portables. A West specialist will be glad to make a survey and set up an Insect Control Program to fit your needs. Without obligation. Just mail the coupon.

YES! Tell us about your Insect Control Plan

☐ Please send me the West Insect Control Booklet

☐ Have a West Insect Control Specialist call DEPT. 8

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

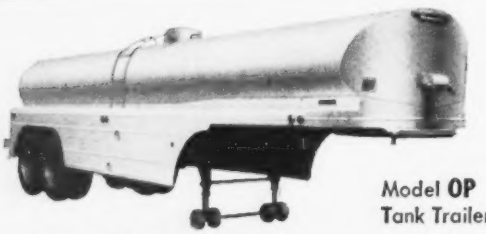
WEST DISINFECTING Company

42-16 West Street, Long Island City 1, N. Y.

For more information, use coupon on page 159.

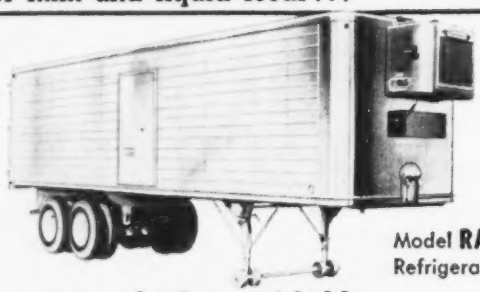
FOOD HAULING IS A SPECIALIZED BUSINESS. IT REQUIRES PROPER EQUIPMENT FOR A PROFITABLE OPERATION

For SWIFT PROTECTED RELIABLE hauling.. specify TRAILMOBILE!



Model **OP**
Tank Trailer

For milk and liquid foods...

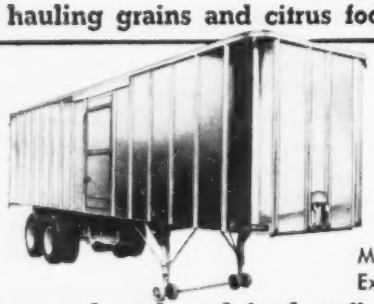


Model **RA**
Refrigerator Van

For meat and other perishables...

Model **GA**
Grain Rack

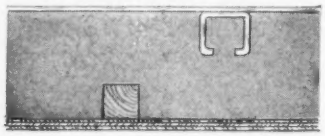
For hauling grains and citrus foods...



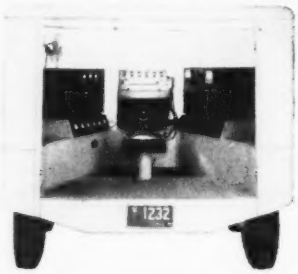
Model **EP**
Exterior Post Van

For general packaged food stuffs...

The Trailmobile tank warranty guarantees against shell leakage, and pays $50.00 a day as long as the unit is out of operation due to shell leakage. This guarantee is issued with every new Trailmobile tank and applies for the original owner's protection for a period of one year. This is in addition to the standard Trailmobile product warranty. It's additional proof that Trailmobile tanks are tops and the best buy you can make.



Floors, doors, top and sides of all Trailmobile Refrigerator Vans are scientifically insulated to prevent heat leaks. Picture above shows how Trailmobile staggers spacers and stringers, fills all side posts with Fiberglas to prevent even the smallest direct heat channel.



Before you ever get your Trailmobile trailer it's been proved right because Trailmobile's exclusive Electronic Tester tells under actual load and road conditions where any weakness might occur. This results in a trailer you can trust to give you years and years of reliable service.

T/M TRAIL-MOBILE

The Trend is to **TRAILMOBILE**

PULLMAN

TRAILMOBILE INC.

CINCINNATI 9, OHIO BERKELEY 10, CALIFORNIA

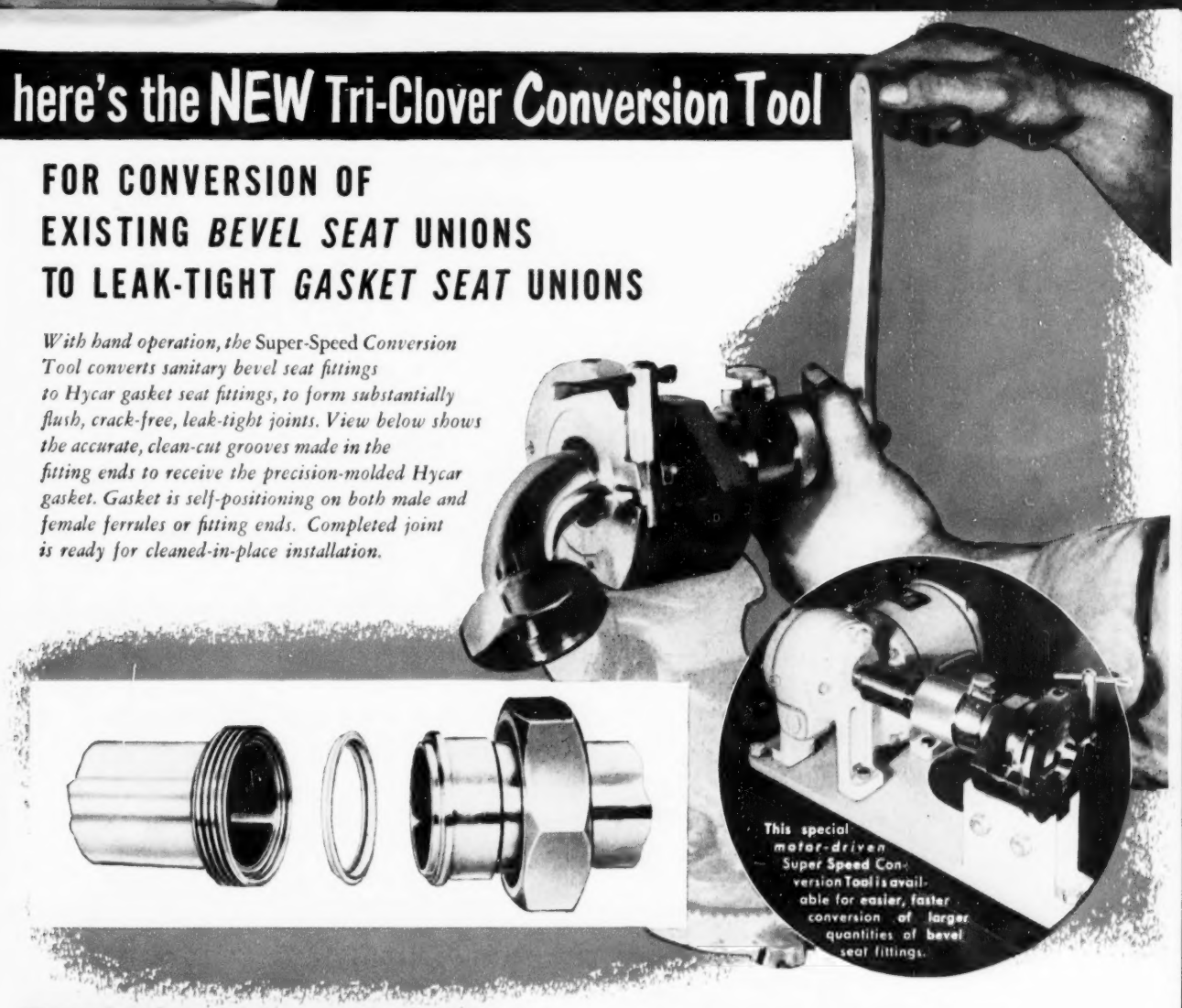
Friendly Sales and Service from Coast to Coast

For more information, use coupon on page 159.

here's the NEW Tri-Clover Conversion Tool

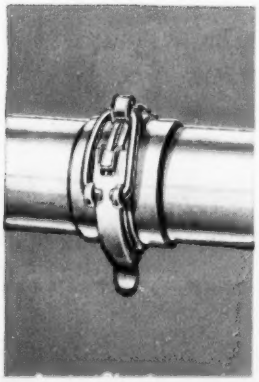
FOR CONVERSION OF EXISTING *BEVEL SEAT* UNIONS TO LEAK-TIGHT *GASKET SEAT* UNIONS

With hand operation, the Super-Speed *Conversion Tool converts sanitary bevel seat fittings to Hycar gasket seat fittings, to form substantially flush, crack-free, leak-tight joints. View below shows the accurate, clean-cut grooves made in the fitting ends to receive the precision-molded Hycar gasket. Gasket is self-positioning on both male and female ferrules or fitting ends. Completed joint is ready for cleaned-in-place installation.*



This special *motor-driven* Super Speed Conversion Tool is available for easier, faster conversion of larger quantities of bevel seat fittings.

. . . gradually convert to TRI-CLAMP *cleaned-in-place lines*



After converting existing fittings, you can extend lines with Tri-Clover TRI-CLAMP fittings . . . which provide a joint consisting of a flange type ferrule, precision molded gasket, and the TRI-CLAMP itself . . . a spring clamp which grips ferrule edges with a snap-action toggle assembly . . . always ready for instant assembly or disassembly.

Available in a full line of fittings and valves, in 1½", 2", 2½", 3" and 4" sizes. Covered in Catalog 1-152A.

With the simple, positive *Super Speed* Conversion Tool, you can now accurately and easily convert sanitary *bevel seat* fittings and unions to close-fitting, leak-tight *gasket seat* joints—to be used as regular "take-down" lines or "cleaned-in-place" piping.

Check these 6 features:

1. No dimensional change made during conversion . . . end-to-end dimensions of existing pipe lines remain the same.

2. Convert present lines to cleaned-in-place lines . . . can be done progressively and used while change-over is in progress.

3. Convert bevel seat to gasket seat with substantially flush interior, crack-free joints, and absolutely leak-tight.

4. Hycar gaskets are precision molded, self-positioning, smooth, non-toxic, fat resistant, non-absorbent, and can be sanitized by steam to 250°F.

5. Damaged bevel seat may be reclaimed by converting to gasket seat.

6. Add on with Tri-Clamp fittings.

Write for further details.

Tri-Clover
MACHINE CO.
Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

CT153

Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters

Here is Why!

You can dispense with oil filters and dust filters when you install ®Nash® Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

®Nash® Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now.

No oil filters.
No dust filters.
No internal lubrication to contaminate air handled.
No internal wearing parts.
No valves, pistons, or vanes.
Non-pulsating pressure.
Original performance constant over a long pump life.
Low maintenance cost.

NASH ENGINEERING COMPANY
373 WILSON, SO. NORWALK, CONN.

Emphasize Rich Fruit Flavor in your Brand with *Sweetose*®
CORN SYRUP

Use Staley's Liquid Sweetener to Bring Out Natural Flavor in Your Jams, Jellies and Preserves.

Sweetose can make *your* brand an outstanding, fast-selling favorite! An enzyme-converted corn syrup, *Sweetose* is Staley's new liquid sweetener that emphasizes natural fruit flavor in all jams, jellies and preserves. It is sweeter, more fluid, more resistant to caramelization than ordinary syrups. Water white, odor and flavor free, *Sweetose* adds no taste except sweetness, gives you these *big advantages:*

1. Emphasizes rich fruity flavors
2. Reduces excessive overpowering sweetness
3. Prevents crystallization
4. Preserves natural fruit colors
5. Adds gloss to products
6. Imparts excellent body and texture
7. Cuts costs and adds convenience with *completely automatic handling* system

Write now for full details about *Sweetose* and the many advantages it offers in *your* processing.

OTHER QUALITY STALEY® SYRUPS FOR PROCESSORS OF JAMS, JELLIES AND PRESERVES

Intermediate Syrup

Imparts medium sweetness—adds gloss and firm texture. Low cost.

Regular Corn Syrup

Imparts low sweetness—adds gloss and firm texture. Low cost.

Sweetose®

Staley's enzyme-converted corn syrup

A. E. Staley Mfg. Co., Dept. FE-5

Decatur, Illinois

PRODUCTS FROM CORN
Staley's

For more information, use coupon on page 159.

News in 1940—production necessity today

ONLY a few years ago, the science of sensitive, accurate measurement was limited to laboratories. But today, this science is practiced every day in thousands of industrial plants by factory men . . . who don't have to be instrument experts.

Production men wanted to put this science to work, for they had long known that many processes would function at greater efficiency if temperature, pressure and other variables could be more accurately maintained. Although these potential benefits could be proved in the laboratory or in pilot plants, they could seldom be exploited fully in actual production.

Milestone in measurement

One of the main reasons was that existing industrial methods of measurement were not sufficiently accurate, sensitive or fast. Instruments with delicate mechanical balancing systems suffer inherent limitations . . . always require a compromise between sensitivity and ruggedness . . . and can provide only periodic measurements.

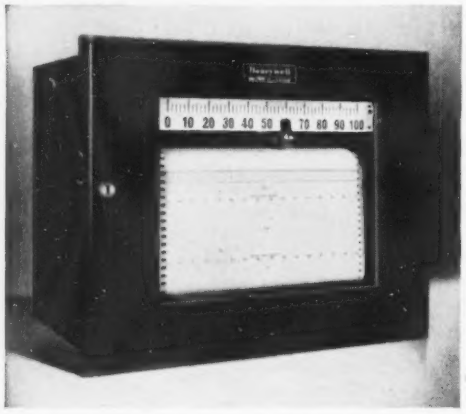
Then, in 1940, the advent of *ElectroniK* instruments swept away these limitations. By adopting an entirely new approach—electronic continuous balancing—these instruments revolutionized the concepts of industrial measurement. They placed laboratory accuracy and sensitivity at the disposal of the production man . . . with all the simplicity and ruggedness demanded by industrial service . . . *plus* speed of response never before economically practical.

Proved by years of performance

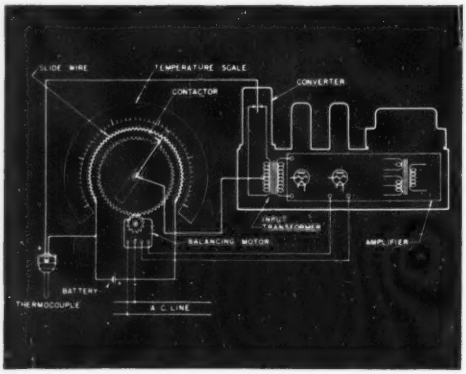
In the past thirteen years, thousands of plants have discovered almost endless applications where the superior performance of these instruments helps to improve operations. The more they learn about *ElectroniK* instruments, the more they call on them for increasingly complex tasks of measurement and automatic control.

Since 1940, the *ElectroniK* family has grown to encompass a host of new indicating, recording and controlling models . . . capable of measuring scores of different process variables . . . equipped with the most advanced types of automatic control. In anticipation of the needs of the future, Honeywell's intensive development program is bringing to readiness even more advanced equipment for tomorrow's process control problems.

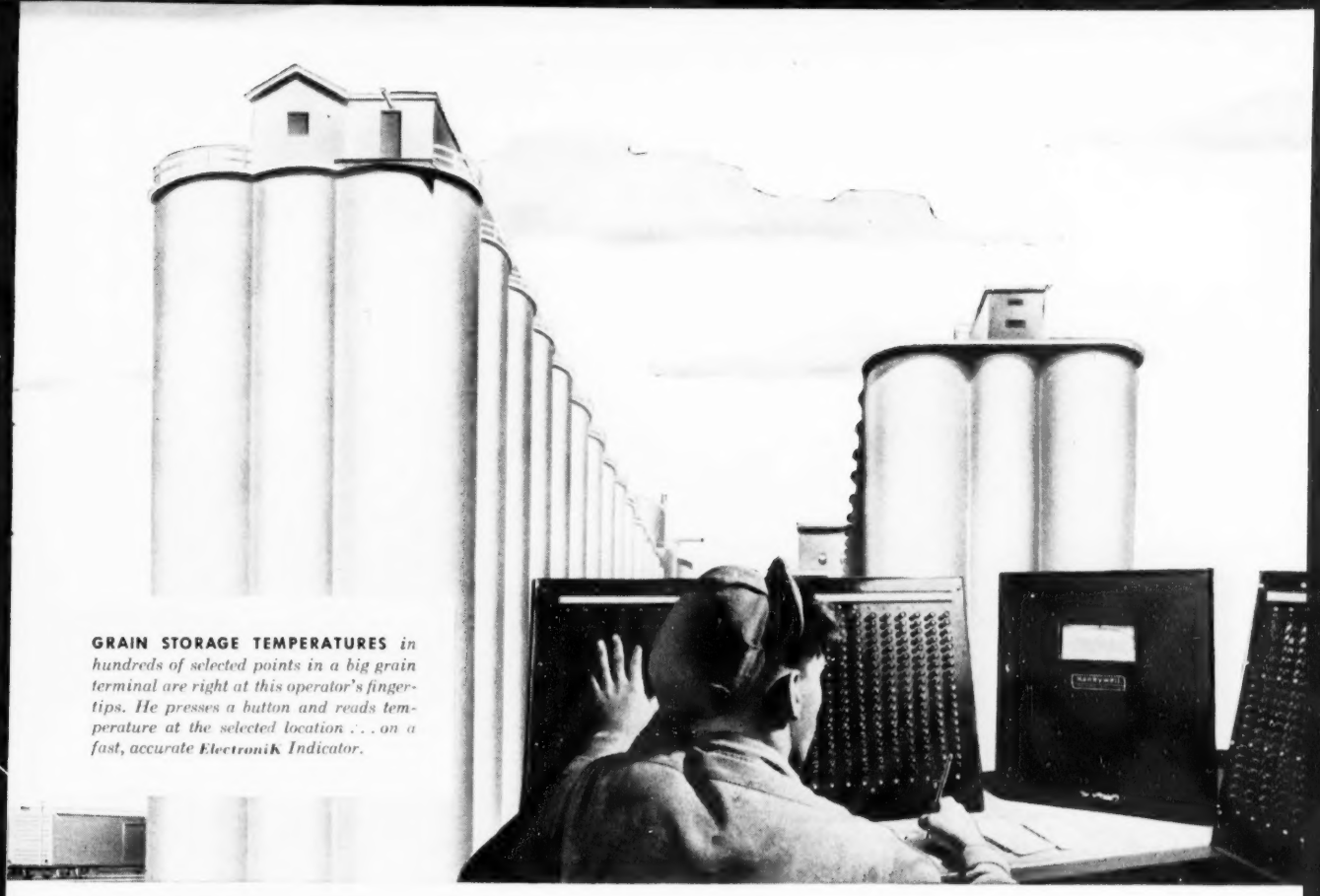
ElectroniK
speed progress



A FAMILIAR SIGHT *to thousands of production men, scientists and engineers is this strip-chart* ***ElectroniK*** *Recorder, one of a complete family of indicating, recording and controlling instruments.*



POWER PLANT *of* ***ElectroniK*** *instruments amplifies a millionfold the minute electrical signals from thermocouples and other sensing elements.*



GRAIN STORAGE TEMPERATURES *in hundreds of selected points in a big grain terminal are right at this operator's fingertips. He presses a button and reads temperature at the selected location . . . on a fast, accurate ElectroniK Indicator.*

instruments continue to *throughout the food industry*

THE TREMENDOUS advancements made in the food industry have been due in no small part to the availability of modern methods of measurement and control—with *ElectroniK* instruments. On the new, revolutionary processes . . . and on older processes where measurement was previously considered impractical or inaccurate . . . these instruments have made outstanding contributions:

Temperature measurement: multipoint indicators and recorders centralize supervision of grain storage (illustrated above), juice concentration and many other processes.

Temperature control: *ElectroniK* resistance thermometers permit split-degree precision of temperatures in milk pasteurization, evaporation, candy cooking, aseptic canning.

Conductivity control: boosts efficiency of caustic peelers.

pH control: neutralizes cream continuously . . . automatically.

Speed control: improves quality of baked goods through automatic regulation of oven feed.

Density control: aids processing of sugar liquor to specified Brix value.

The versatile family of *ElectroniK* instruments is ready to serve you, whether you're expanding or modernizing your production. You'll benefit, too by the application know-how that Honeywell has gained in years of food industry experience. Your local Honeywell engineering representative will be glad to discuss your control problems . . . and he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4502 Wayne Ave., Philadelphia 44, Pa.

● **REFERENCE DATA:** Write for Catalog 1520, "*ElectroniK* Indicators and Recorders."

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

H HONEYWELL

Pares cost of peeling potatoes
. . . with help of TIMKEN® bearings

How **MJM MANUFACTURING COMPANY** mounts the drive of its potato peeler on Timken bearings to assure faster peeling and longer life.

THIS MJM all-aluminum potato peeler features self-sharpening carborundum cutting abrasive, and is designed to eliminate the production of wasteful "flats" while peeling. To assure faster peeling and longer life, with a minimum of time-outs for maintenance and repair, the peeler's drive is mounted on Timken® tapered roller bearings.

Due to their tapered construction, Timken bearings carry both radial and thrust loads in any combination. Shafts are held in positive alignment, with a minimum of end-play and deflection. There's less wear on moving parts and longer machine life results.

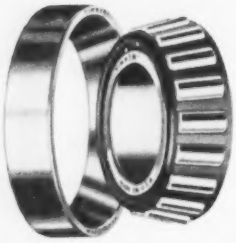
Line contact between rollers and races of Timken bearings gives extra load-carrying capacity. And their true rolling motion and smooth surface finish virtually eliminate friction.

Timken bearings make closures more effective. Lubricant stays in—dirt and moisture stay out. There's less time and money spent in lubrication and maintenance. And because they're engineered for the job, made of Timken fine alloy steel, and are precision manufactured, Timken bearings normally last the life of the machine.

For dependable, low cost performance of the machines you build or buy, make sure they're equipped with Timken bearings. Always look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.



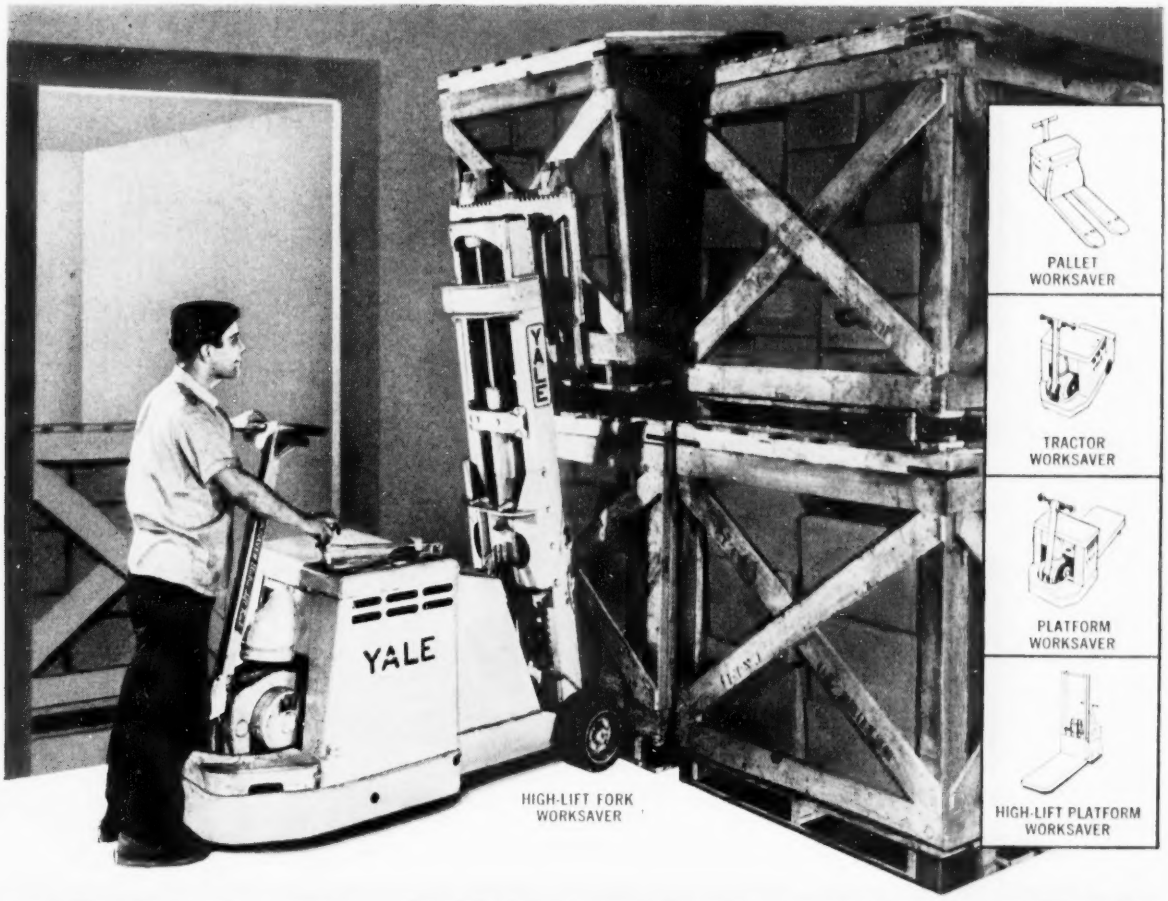
TIMKEN

TAPERED ROLLER BEARINGS

MAGNIFYING GLASS INSPECTION OF EVERY ROLLER!

Every one of the over one billion Timken bearing rollers produced every year is inspected with powerful magnifying glasses to detect surface flaws. It's just one example of how the Timken Company insures uniform high quality.

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION



YALE *WORKSAVERS*

give big truck power ...where big trucks can't go

Where size and weight rule out big trucks, YALE WORKSAVER ELECTRIC TRUCKS take over. Yes, YALE WORKSAVERS save industry time, manpower and money where low-load capacity flooring, unreinforced elevators and ramps had previously restricted materials handling operations to back-breaking manual moving, lifting and stacking.

YALE WORKSAVERS give big truck advantages...big truck versatility...at small truck cost! Features include forward and reverse power travel–hydraulic lift–complete range of use-extending attachments. Contact your local Yale Representative for a demonstration of the WORKSAVER line in your own plant...at your own time.

YALE*

*Registered trade mark

5TH NATIONAL MATERIALS HANDLING EXPOSITION MAY 18-22, 1953 PHILADELPHIA

MATERIALS HANDLING EQUIPMENT

MAIL THIS COUPON TODAY

The YALE & TOWNE Manufacturing Co., Dept. 465
Roosevelt Blvd. and Haldeman Ave., Phila. 15, Pa.

Please have your local representative call for an appointment.

Company_____

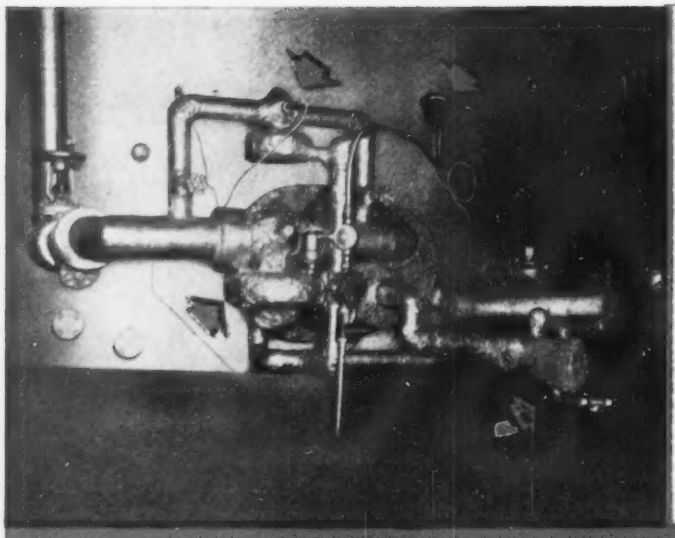
Name_____ Title_____

Street_____ City_____ State_____

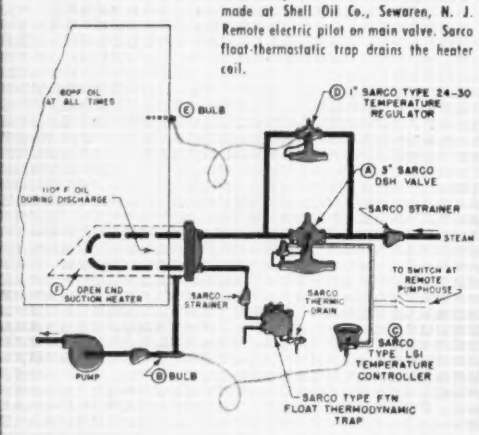
In Canada write: The Yale & Towne Mfg. Co., Box 337—Postal Station "A," Toronto

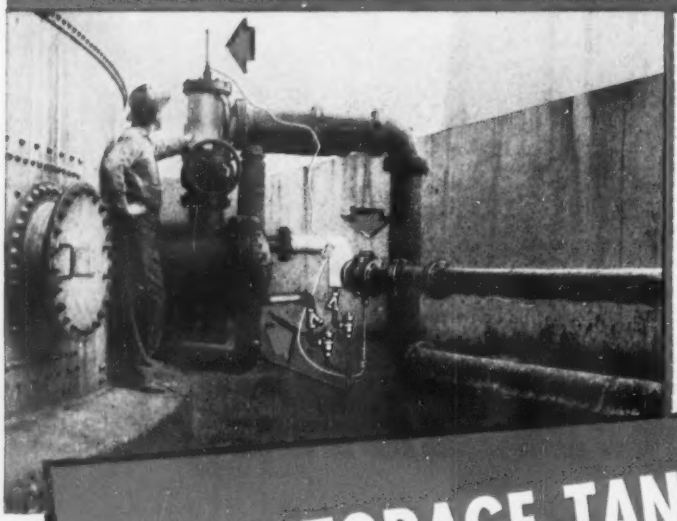
Gas, Electric, Diesel Lift Trucks • *Worksavers* • Hand Trucks • Hand and Electric Hoists • Pul-Lifts

For more information, use coupon on page 159.

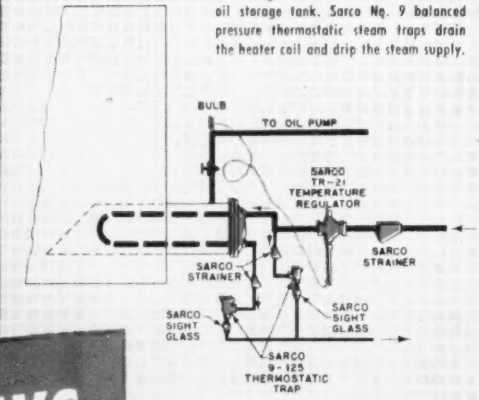


● Fig. 1, Sarco type 24-30 self-contained, pilot-operated Temperature Regulators on bulk storage tanks. One of 13 installations made at Shell Oil Co., Sewaren, N. J. Remote electric pilot on main valve. Sarco float-thermostatic trap drains the heater coil.





● Fig. 2, Sarco TR-21 self-operated Temperature Regulator on suction heater of fuel oil storage tank. Sarco No. 9 balanced pressure thermostatic steam traps drain the heater coil and drip the steam supply.



BULK STORAGE TANKS

● SUCTION HEATERS, as widely used to bring heavy fuel oil in bulk storage to pumping temperature, require *fast acting* temperature control. All the controlling must be done while the oil is drawn off through the heater.

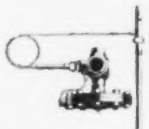
The control valve must be of the dead-end, *tight shutoff* type to prevent running away of the temperature when no oil is pumped out.

Sarco self-contained, pilot operated regulator, type 24-30, (Fig. 1) meets these requirements perfectly and will hold delivered fluid temperature constant within close limits.

Fig. 2 is a simplified hook-up for low pressure steam, using self-operated regulator, type TR-21

Send for a Questionnaire or write for Catalog 600-14, to Sarco Company, Inc., Empire State Bldg., New York 1, N. Y. Branches in principal cities. Sarco Canada Ltd., Toronto 8, Ont.

Sarco self-operated Temperature Regulator, type TR-21, sizes ½" to 8", for low pressure steam.



Sarco pilot-operated Temperature Regulator, type 24-30 for dead-end service and high steam pressure.

A Sarco pipeline strainer should be ahead of every regulator to keep out dirt and scale.

SARCO saves steam

improves product quality and output

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Let us pour you a sample of this homogenized emulsifier

This is Myverol® Distilled Monoglyceride homogenized with nitrogen to produce a wholesome, smooth-flowing white cream that retains its uniformity.

The monoester content of this emulsifier is 90%, as compared with the 40% common in ordinary commercial monoglycerides. And there's no question about its wholesomeness for use in such food products as baked goods, shortening, margarine, peanut butter, dessert topping, and others that call for smooth dispersions.

Myverol Distilled Monoglycerides are prepared from natural fats and oils, then concentrated by molecular distillation. This means they're low in diglycerides and impurities that inhibit emulsification or degrade product taste.

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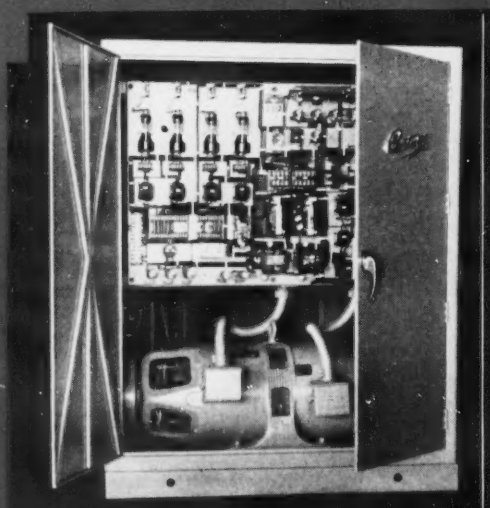
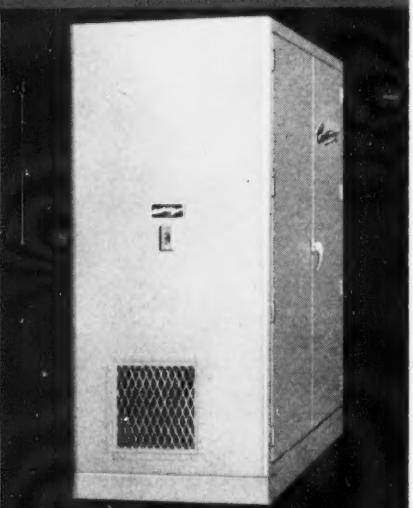
Century SELECTIVE SPEED **Drive**

POWER UNIT—Inside front view showing control and motor generator set.



Side view of power unit showing air cleaner for forced air ventilation.



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- Engineered for specific application requirements, with regard to: Load jogging—load acceleration—normal or quick deceleration with adjustable dynamic braking—jog in reverse or run in reverse, or both—multiple coordinated drive motors—remote single or multiple control positions.

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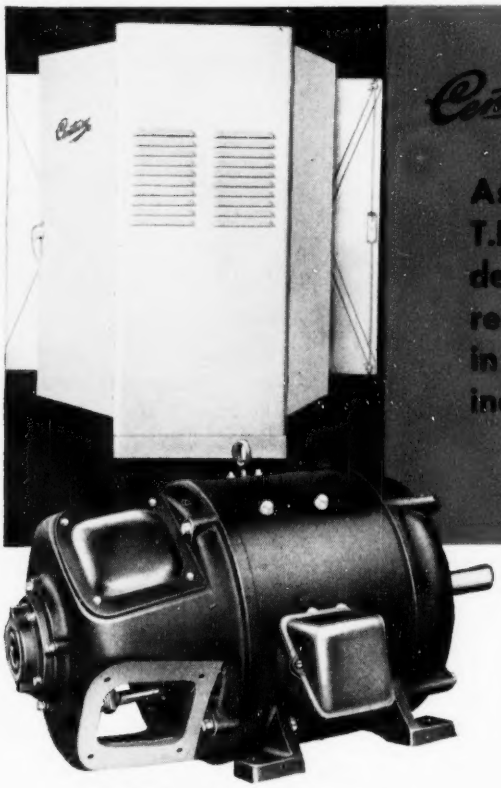
Side view of Power Unit. Rear doors are available when special control requires access.



Typical drive motor which operates from the alternating current power unit.

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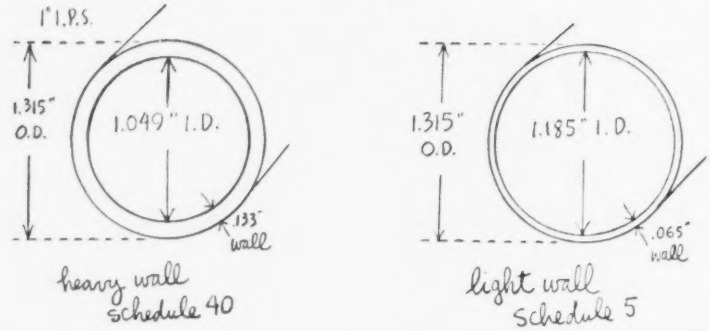
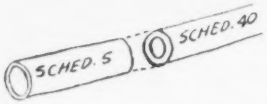
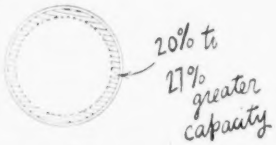
here's what you gain with stainless schedule 5 pipe



You save money. Schedule 5 pipe costs about half as much per foot as Schedule 40.

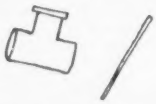


Schedule 5 has the same O.D. as Schedules 10, 40 and 80 —for hook-up with existing lines as well as for new installations.

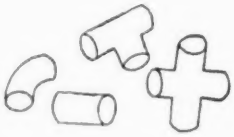


Its larger I.D. increases flow and capacity in pipelines, exchangers and other equipment.

It's lighter. This means quicker and easier installation.



You can save substantially on valves, fittings, weld rods, etc., because smaller O.D. material can frequently be used. Tubing sizes can now be replaced with light wall pipe . . . for ready hook-up with standard valves, pumps, and other equipment normally manufactured in pipe sizes.



Fittings as well as stocks of Schedule 5 pipe are carried by conveniently located Carpenter distributors.

Specify Schedule 5 pipe . . . it saves dollars . . . and makes a lot of sense!

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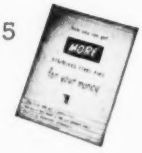
Data Sheets give you complete information about Carpenter Schedule 5 Stainless Pipe. Write for your personal copy.



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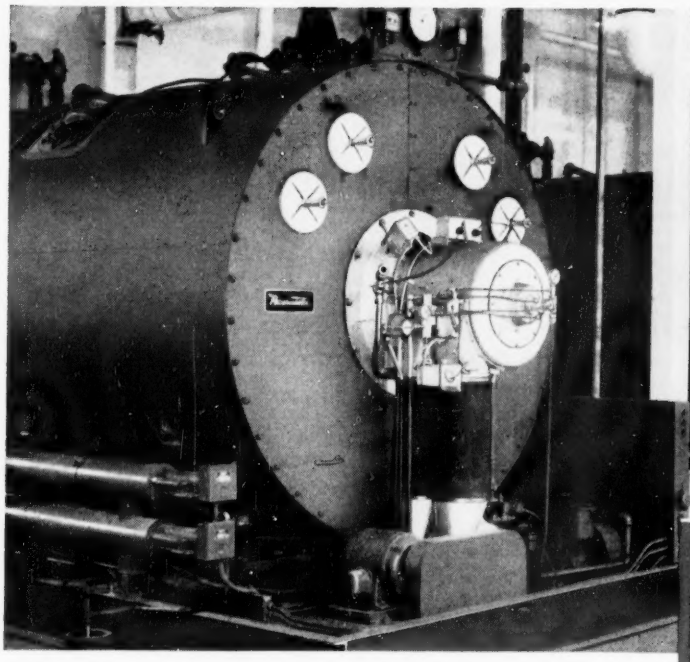
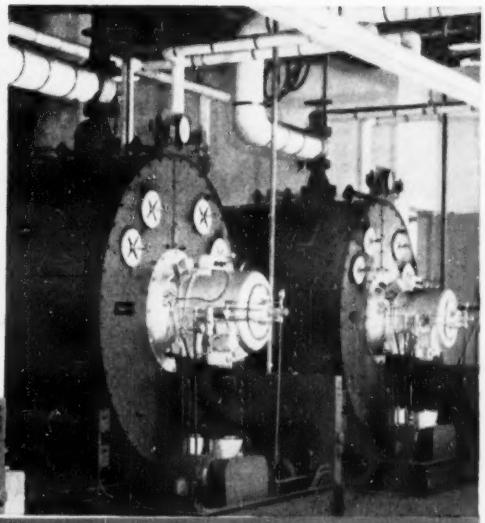
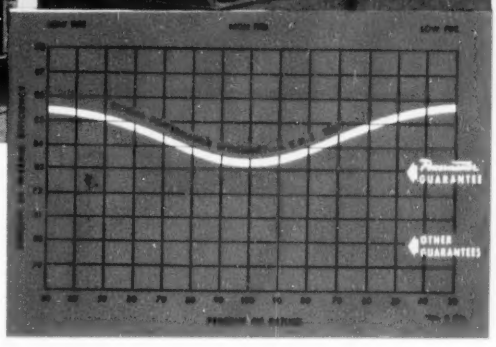






This battery of 350 HP *Powermaster* boilers handles the steam requirements at the Bayshore, L. I., plant of the Fairchild Engine and Airplane Corporation. A.S.M.E. tests at the plant surpassed *Powermaster's* 83% efficiency guarantee.

83% minimum efficiency with No. 6 Oil guaranteed only by Powermaster®

The "pay-off" on a boiler is its operating efficiency!

Take a look at this typical efficiency curve of *Powermaster* . . . then compare A.S.M.E. tests with those of any other boiler! At less than full load (which is normal in field operation) notice that *Powermaster* efficiency actually *increases.*

There's a reason for such efficiency. The *Powermaster* is the development of 68 years' experience in boiler manufacture. Continuing research and progressive engineering have consistently been reflected in *Powermaster* design:

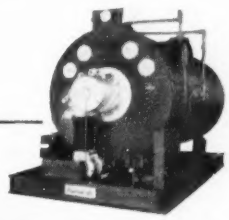
- **FIRST to provide the Voriflow air-atomizing burner.**
- **FIRST to provide full modulating cam control.**
- **FIRST to provide immediate change-over from oil to gas firing.**
- **FIRST to provide a complete packaged unit.**

Point-by-point, *Powermaster* welcomes comparison. Before deciding on a new boiler for your plant, be sure to get the facts on the new *Powermaster* with *Voriflow* combustion. Just drop us a line and we'll be glad to send you complete information.

Powermaster®

PACKAGED AUTOMATIC BOILERS

In sizes to 500 HP; pressures to 250 psi.



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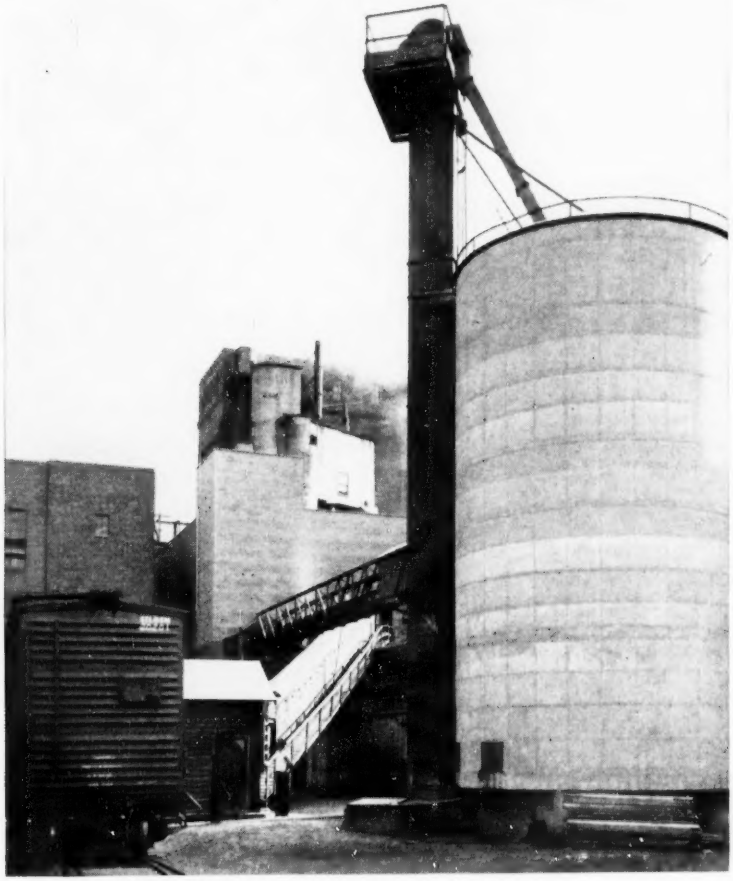
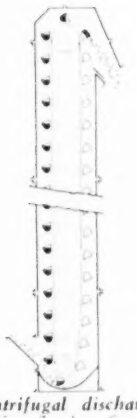
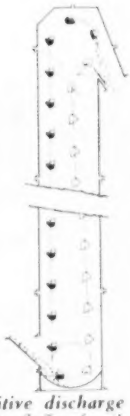


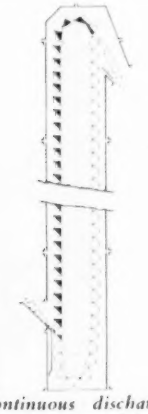
Link-Belt screw conveyor and bucket elevator handle material from railroad car to storage silo.



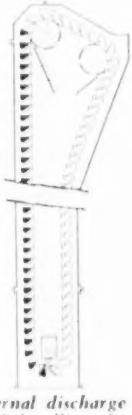
Centrifugal discharge for free-flowing, fine or loose materials with small to medium lumps.



Positive discharge for light, fluffy, fragile or any materials that tend to stick to the buckets.



Continuous discharge for many materials — light to heavy, small to large, abrasive lumps.



Internal discharge for gentle handling of small articles such as pellets, rivets, seeds, castings.

Let LINK-BELT recommend the bucket elevator best-suited to your needs

WHERE large or small quantities of bulk materials must be elevated in limited space, a bucket elevator is the equipment you need in most cases. And, in every case, you'll find the one that can do the job for less in the complete Link-Belt line.

Link-Belt builds a type and size of bucket elevator for every requirement. Included in the 4 basic designs are 13 types of bucket elevators designed to suit a variety of materials. A wide range of sizes on chain or belts is also available.

Other Link-Belt engineering extras: Rigid, jig-built casings are self-supporting requiring only occasional lateral tie-ins depending on height. Periodic inspection is speeded with easy access to both head and boot. Chain or belt tension is maintained at all times with simple screw or gravity take-ups. You can get complete engineering information from the Link-Belt office near you.

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LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 13,213-A

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for Stainless Pipe and Tubing . . . *every other stainless product*

Just a single call to your nearby Ryerson plant brings everything you need in stainless pipe and tubing—any type, size or quantity for the most exacting requirements of heat and corrosion resistance.

That's because Ryerson stocks are not only large, but varied to meet your special applications. (See list at right.) What's more you can have your steel accurately cut to specification and you can always be sure of quick delivery from Ryerson.

You can be sure of quality, too. All stainless pipe and tubing from Ryerson meets appropriate ASTM specifications. All is pressure tested and rigidly checked for ductility to insure best forming characteristics.

You can also get quick delivery on stainless screwed and welding pipe fittings, Quikupl fittings for time-saving assembly and globe and gate valves. So for complete stainless service, including the help of our stainless specialists, call your nearby Ryerson plant.

STAINLESS PIPE AND TUBING IN STOCK

Note that our stocks include Schedule 5 and 10 light wall pipe which you can use in place of standard pipe for many applications. With light wall you reduce weight 17 to 65% — with proportionate savings in cost. Yet capacities are increased.

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Schedule 80—Extra Heavy Weight—Seamless

TP316 Pipe.....Schedule 5—Light Wall—Welded
Schedule 10—Light Wall—Welded
Schedule 40—Standard Weight—Seamless & Welded
Schedule 80—Extra Heavy—Seamless

TP304 Tubing...Seamless & Welded
TP316 Tubing...Seamless & Welded

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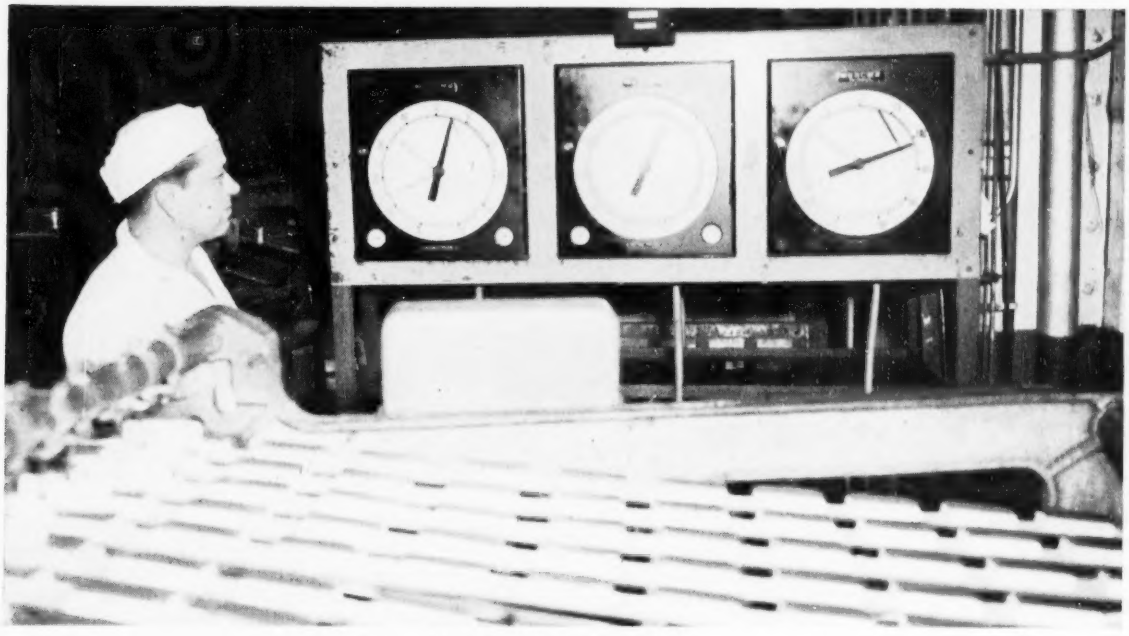


Line Sentinels in Action

BELT-BORNE BARS go whizzing by this trio of line-supervising instruments at discharge end of Mars' new mechanized candy line. Left hand and center units precisely control temperature of slab-cooled candy. Tachometer at right boldly registers line speed. Small counter above panel tabs number of strokes taken by cutting knife.

Applying Food Engineering at Its Best

Mars Revolutionizes Process

Squeezes 16-hr. operation into 35 min. and small floor area, while improving quality. Develops continuous forming, cooling, coating, and cutting lines. Machine innovations and advanced instrumentation utilized.

LLOYD E. SLATER
Associate Editor, "Food Engineering"

It seems poetically appropriate that a formula by Einstein should figure in the production of a Mars bar.

No, the Master Physicist has not branched into candy making. In this case the formula had mathematical ingredients—it was his classic equation for Brownian activity and was applied by Mars, Inc. engineers in probing the physical behavior of nougat in process.

This is but a telling commentary of the lengths gone to during those involved and searching studies that led to creation of the company's precedent-shattering continuous candy-making process.

Like Einstein, the Mars innovators dealt in basic factors of time and space. Preconceived notions based on prolonged kitchen-art techniques had to be chucked aside. And—to satisfy continuous dynamism—unbelievable new balances between product quantity and reaction rate had to be established.

Upshot of all this is dramatically visible today in the company's completely revamped plant where five of these newborn mechanical candybar-making lines have—

- **telescoped process time from a pre-previous 16 hr. to only 35 min.**
- **contracted process space needs to a fraction of former floor area.**
- **enhanced the uniformity and quality of the company's product.**

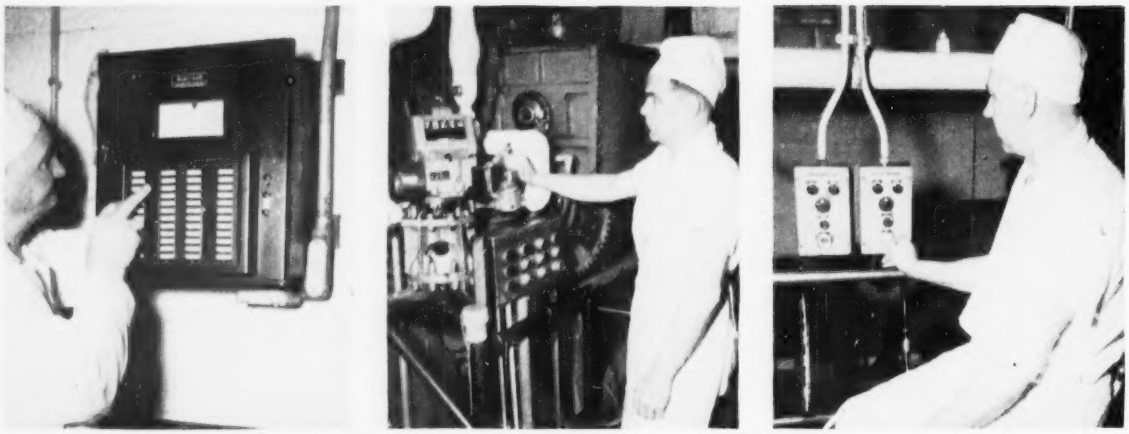
In the foldout flowsheet in this issue of Food Engineering the new Mars production line is depicted from stem to stern. Hence, a surface description is not necessary here.

However, a real marvel is the thinking and detail work behind its smooth-running operation. What keeps equipment from jamming with sticky ingredients? How are the bars cut on a moving belt? What is done to control bar size?

Solving these and countless allied

HOW MARS' STRIKING candy line operates is graphically portrayed in this month's special FE Foldout-Flowsheet. You'll find it on pages 120-123.

Precision by Pushbutton



ROBOTIZED LINE operations are pushbutton controlled at strategic points. Multi-point indicator (left) provides rapid scan of vital temperatures at feed end of line. Mixer station (center) also includes automatic shut-off flowmeter for adding oil. Dry ingredients are portioned to mixer by vibrator-feed control station (right).

problems involved much tedious and often brilliant engineering, and this article will attempt to highlight this outstanding work.

But first a word about how the process was conceived:

Management Spurred

In 1946, after war-paced demands had wearied equipment and frozen developments, the company's management faced up to reality. A large and growing market was there for its bars—provided prices could be held. But ingredient and manpower costs were spiralling high. It was obvious that only a drastic shake-up in manufacture could meet the situation.

Some searching conferences among key production and technical men turned up a provocative thought. It was generally agreed that the time-honored method of forming bars on cooling slabs and hand cutting was the worst ball-and-chain on costs. Why not mechanize these operations on an endless conveyor feeding into the standard enrobing, cooling, and packaging belt system?

A sizable investment was subsequently made for theorizing, designing, and fabricating a prototype line, which turned out its first bars early in 1948.

Since the new equipment was entirely without precedent, parts had to be laid out in minute detail so that contracting shops could make components that would fit together smoothly. And as many as 20 draftsmen were employed on the project at one time. For a fair idea of this detail, it is suggested that the reader review U.S. patents 2,612,851-2 and 2,620,753—all held by Mars Inc.—which include unusually fine sketches and descriptions.

Essentially, designing the line involved five basic problems: Spreading nougat on a moving belt; the belt design itself; effective continuous cooling; a means for overlaying caramel and nuts; and a system of continuous cutting. But it was found that while each of these problems was soluble in itself, the big poser was the actual integration of unit components into a free-flowing or fluid-like operation.

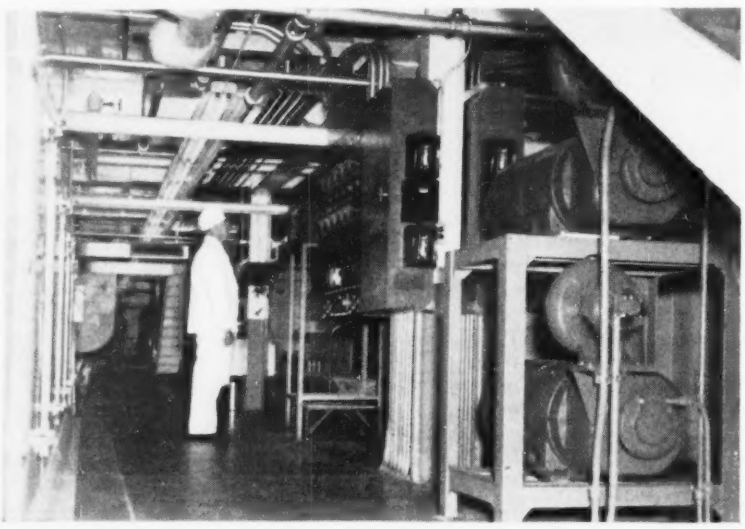
Taming the Line

For example, variations in thickness of the bar laid down depended not only on the mix coming in, but also its head at the spreader, its temperature, and the speed of the belt. Conversely, thickness variations—due to any or all of these causes—could upset performance in subsequent overlaying, cutting, and enrobing.

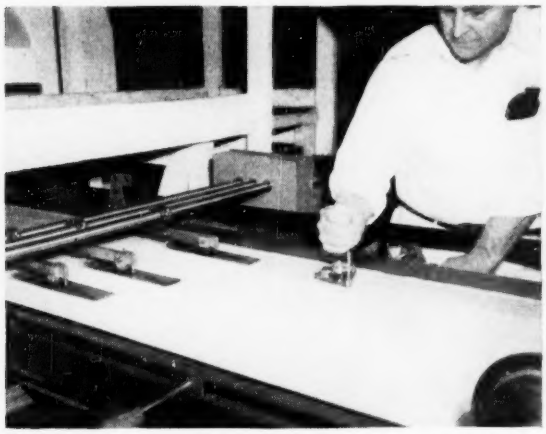
It was obvious that to watch and keep these many forces in balance would require at least as many man-

Line-Mesher at Work

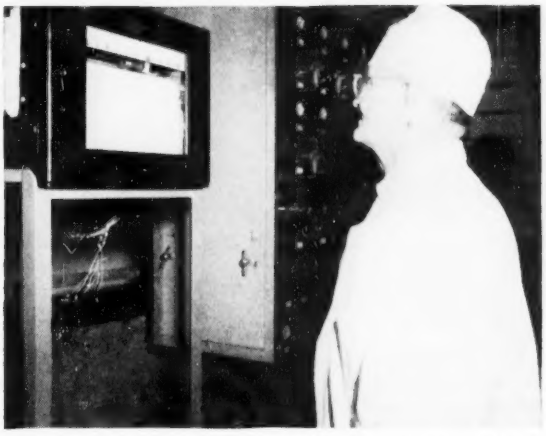
LINE SPEED can be varied through action of frequency changer (right), which meshes rpm. of motors at various unit operations to achieve balance. Here, operator scans special "dimensiometer" recorder, which is midway down long line. Section at left is part of high-velocity cooling tunnel that belt-cools fast moving candy slab for subsequent cutting.



Sheet of Confection is "Tabbed Enroute" for Thickness



CANDY THICKNESS is gaged by these Teflon-bottomed steel "shoes" that ride over the moving sheet. Position is transmitted through overhead axles. Attendant is testing instrument accuracy with hand-operated gage.



THICKNESS RECORDER prints a numbered record of six "rider" positions at high speed. Variation in depth of candy sheet as small as 0.003 in. will show up in 1/32-in. pen movement on instrument strip chart.

hours on the new line as former methods. Hence, a critical study was made of the controllability of the operation, with a special eye toward the much needed flexibility necessary to a varied production.

But rather than dwell on mechanical and automatic line aspects at random, let us proceed from the initial spreader rolls and spot the innovations as we go along.

Sticky Problems Solved

By far the greatest obstacle to the project was the stickiness of the candy itself—and this appeared most acutely at the initial spreader rolls.

In a nutshell, the spreading device had to handle a warm, plastic mixture of nougat and lay it out in a sheet of uniform thickness and width on a traveling stainless-steel belt. Anyone who has handled this product knows how it can gum up on even the most highly polished surface.

To spread the candy, a pair of spaced brine-cooled stainless steel rollers are fed above from a slot-bottomed hopper directly below the nougat mixers. These rolls rotate toward each other, and two knife edges separate the interspersed surface-cooled candy in the form of a flat sheet, which falls upon the moving belt below.

Since it is highly important that the resultant candy sheet be of a definite thickness and width, one of the rolls is pneumatically loaded and can be held at a fixed, pre-selected distance from the other. Quick exhausting of this air-loading pressure thus permits a joining of the rolls to stop spreading action.

To control sheet width, two rotating hollow retaining disks flank the rollers. These are fed cooling brine through an internal spiral channel. The nougat sheet thereby receives a hardened "skin" on side as well as top and bottom surfaces when it is laid down.

While chilling or surface-hardening the nougat diminished its sticking qualities, it was also found necessary to apply a vegetable oil bath to the rollers to prevent adhesion. This was first done with an elaborate oil-spray device that used air-pressure to apply a mist of warm lubricant over the rolls.

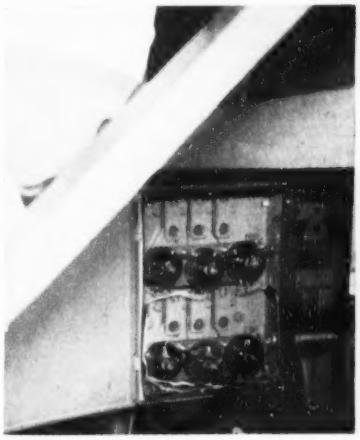
Eventually the oil mist system was replaced by jacketed oil bearing troughs at the far side of each roll—small oil-dipping drums in these troughs contacting and applying a uniform coating to the spreader rolls. A separate hot water circulating system keeps the oil at precise temperature, and integrated air-cylinder action automatically pulls the oiling rolls out of action when spreading is stopped.

Onto the Belt

From the spreader, the nougat sheet is laid down on an endless Swedish-steel belt, 23¼ in. wide. Two drum rollers at either end suspend and drive this conveyor. Also, two endless roller-rotated Swedish steel side belts vertically border the main belt along its length to retain and align the candy sheet.

In designing the conveyor system it was highly important that the belt would not buckle or "wander", with subsequent bulging or straying of product onto mechanical parts.

By an ingenious system of a movable bearing plate, sprocket wheels, and suspended counterweights, the feed-end roller is kept under constant pull—hence the belt itself is always in taut condition. A similar pulling-force arrangement also urges the side belts into a taut position to provide an even candy-retaining border on the main conveyor. A series of rollers, spaced along the conveyor maintain the side belts in upright position and holds them firmly against the main belt surface.



SMALL "POTS" terminating transmitting axles over candy convert motion to electrical signal. Lower three units associate with "riders" under belt and cancel out conveyor variations.

As with the spreader rolls, a vegetable oil coating has to be applied to the main conveyor to prevent sticking. In this case, the under side of the belt at the feed-end is coated by contact with a roller resting in an individually heated vegetable oil trough.

At the opposite end of the conveyor, where the belt loops for return after the candy moves on to slitting and cutting, a special washing assembly continuously cleans away product and

oil remnants. This consists of a two-section enclosed chamber where the belt first gets a high pressure hot water wash and then a hot water rinse.

The side belts get a similar washing at the far end of the conveyor.

Chill On the Run

In the old slab method, the most time consuming and variable operation was that of cooling. It usually took around 16 hr. in the huge static cooling vault to properly set up a slab for cutting—but production could never be scheduled on an exact time basis.

To match the "race track" spreading and subsequent belt cutting that was developed, it was desired to reduce cooling by 800 percent—from a tedious 16 hr. to a matter of a short 12 min.!

This phenomenal objective was achieved by enclosed forced-air cooling tunnel sections and a highly-efficient closely controlled air chilling and circulating system.

Extra compressors had to be added to supply the huge volume of chilled air required. Then, in order to hold the air to the required low temperature, an intricate sytsem of refrigeration controls was installed. Thus, air at optimum chill and under an unusual velocity—supplied by oversize blowers to the discharge end of each tunnel—did the trick.

However, cutting temperature of bar candy is critical, and even these fixed chilling conditions were not enough. It was found that the sheet temperature could vary over several degrees due, for example, to such factors as partial precooling of incoming nougat or caramel to the line.

An ingenious temperature "pick-up" solved the problem. A pencil-type thermocouple was secured at the exit end of each cooling section so that its sensitive tip just skimmed over the surface of the sheet. This provides an accurate and dynamic measurement of sheet-temperature variations and permitted an associated electronic controller to position a damper in the air inlet line.

Current operations thus are able to hold belt-cooling to within the required limits for trouble-free cutting and coating.

Overlying Problems

The company makes six primary bars, of which five are adapted to continuous line production. Of these five caramel or caramel combined with nuts.

To achieve continuous overlaying, a highly specialized and flexible dispenser was designed and placed into the line at about mid-length—at a point where the underlying nougat was well-hardened by cooling.

Basically, this dispenser consists of a vertically mobile stainless-steel hopper poised over the belt and served by telescoping chutes directly from kettles in the cookroom above. Inside the base of the slanted hopper are a pair of belt-wide gears that rotate away from each other and act like a pump to force the candy out, through a variable-width discharge slit, in a sheet over the nougat.

To regulate the thickness and width of spread, the hopper can be moved up or down by a pushbutton controlled motor that changes height by screw action on its four support rods. However, a much more critical control of thickness is exerted by the size of the split opening—which acts like an adjustable orifice.

A finely calibrated indicator permits an exact setting of slit opening to within .005 in., and an air-cylinder provides positive closure of this opening when the line stops.

Where two different layers of candy are desired over the nougat base, the dispensing hopper is divided and two gear-pump feeding devices are utilized in series. In this case, both discharge slits are adjustable so that the applied layers can be varied in thickness.

To incorporate nuts between layers, a straight-through chute, running belt-width and between the two depositing slits, is fed by a vibrating device on the floor above. This automatically adds nutmeats, at a selected rate, for enclosure in the final bar.

Continuous Cutting

After overlaying operations, the candy sheet continues its belt-borne journey through another high-velocity cooling tunnel, where final cooling occurs. It then leaves the stainless steel carrier and passes into an intricate and intriguing slitting and slicing operation.

A bank of parallel-spaced circular steel knives slit the sheet into 18 strips, each measuring 1¼ in. Nine alternates of these travel up an incline on nine bar-wide Neoprene V-belts. The other interspaced nine move down a similar V-belt decline.

Side trimmings from the sheet pass down chutes on either side of the line and into special temperature-controlled radiant-heated receiving bins. This candy is returned to the start of the line and used to "seed" the nougat mix, if desired.

At the end of this V-belt transfer system stands a two-level knife assembly that cuts the strips crosswise into bars, which then go on a reciprocally inclined V-belt assembly. This returns them to a solid Neoprene belt, at one level and appropriately spaced.

A host of unusual design details went into the cutting assembly. Essentially it employs an inverted U-shape frame that is horizontally and reciprocally moved by a flexible drive motor. Its two ribbon-like knife blades, which dissect the bars at two levels, are vibrated 1,200 cycles per minute in their reciprocal downward thrust.

To prevent actual cutting of the bar on, and possibly into, its carrying belt, the end rollers of the belt system are journaled into the moving U-frame. A take-up drum and various rollers cleverly compensate for the relative spacing between the two V-belt transfer systems.

In this manner—but with more refinements than described—the bar strips are *actually uniformly cut while in continuous motion and while passing from one conveyor to another.*

From the cutter, the bars—already properly spaced by the progressively speeded belt system—move through a standard enrober and cooling tunnel prior to the packing station at line-end.

Linking the Chain

Let us now consider how these several line functions were integrated to form a smooth operation:

It was recognized at the start that the relationship between spreader and conveyor speed should be kept constant at all times if bar thickness was to be uniform. To accomplish this—and still permit variable speed in line units—a frequency changer was installed in each line to synchronize its driving motors.

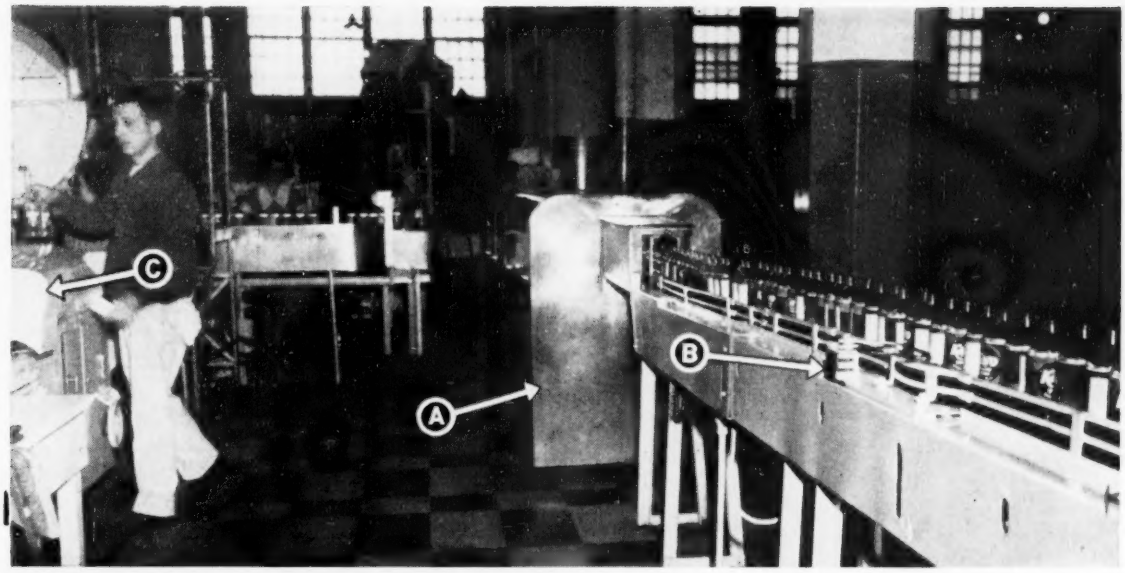
Briefly the frequency changer acts like a rotary transformer to balance electrical cycles against rpm. Thus, its output from 0 to 55 cycles—which can be set from a calibrated dial—will vary line motor speed from 320 to 1,500 rpm.

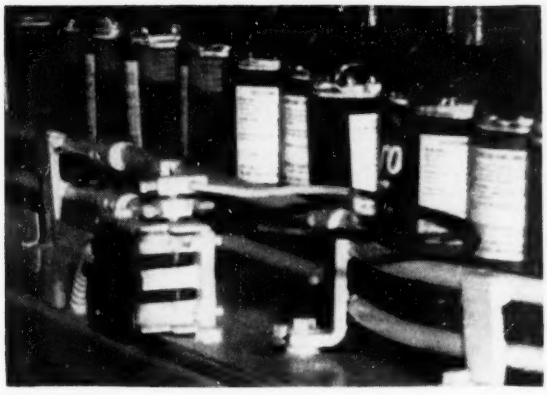
All motors on the line are A.C. induction type units with extra copper in their windings to balance them to frequency. Hence, when the frequency changer rotor is driven faster—which means less cycles in output current to line motors—the line will be slowed down in fully integrated fashion.

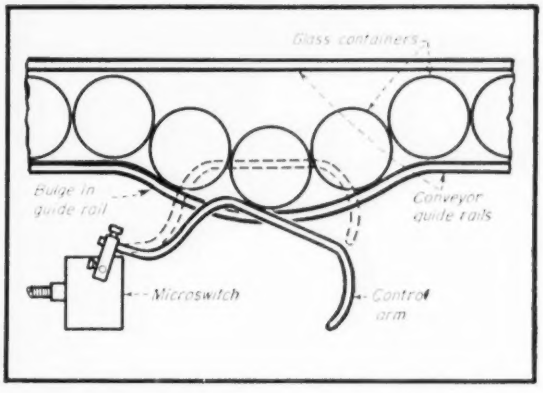
While this frequency control system was initially conceived to hold the relation between belt and spreader, many more functions have been tied into it, and at present almost every motor having any bearing on the process is in "tune" with the line speed.

Actual control of line speed is effected by a calibrated rheostat on a pushbutton station next to the slicer.

(*Turn to page 168*)







1&2 **BOTTLES CLEANED, BREAKAGE CURBED.** View in Corn Products Refining Co.'s Argo plant (top) shows unit that rids bottles of dust (A), and special device that curbs jams and breakage (B). Filler is at (C). Above: Closeup of jam-balker and details of its operation (see article for details).

6 SIMPLE AUXILIARIES

Smooth Packaging Line Performance

Filling, closing, and casing operations are streamlined on modern corn syrup line by adding small, ingenious devices created by sharp-thinking personnel

IVAN C. MILLER
Associate Editor, "Food Engineering"

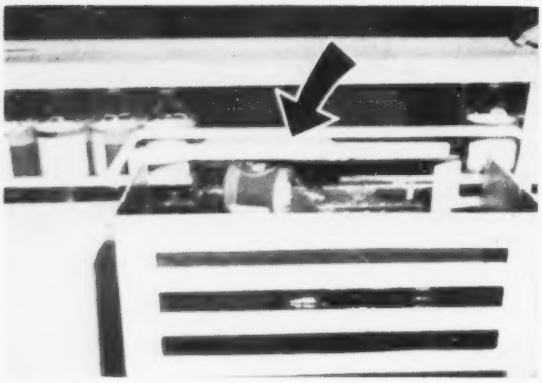
Efficiency of packaging line operation and quality improvement of the package do not depend entirely on high speed machines of the latest design, though these are undeniable assets. Other elements also contribute.

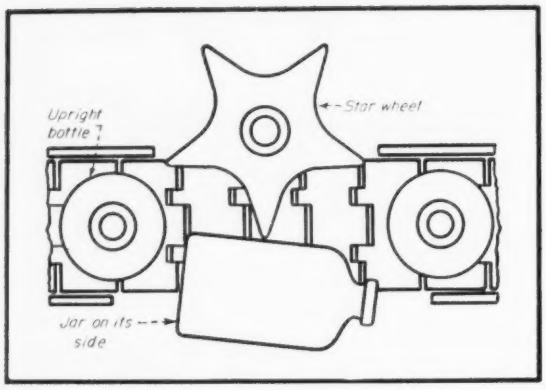
So, when a food plant line delivers, at nominal labor cost, its finished packages, filled within acceptable weight tolerances, accurately closed, labeled and registered—all at high speed and with minimum down time—look for the rest of the story. Most likely you'll find . . .

—A well-staffed engineering set-up
—A competent maintenance crew
—And a modern machine shop

These three tie together individually efficient machines, coordinating and synchronizing them. And also along the line they will add a few auxiliaries —units that reduce labor or ease the task of workers, attachments that speed or smooth a machine's performance, or that foresee and forestall production interruptions.

Auxiliaries, such as those on Corn Products Refining Co.'s Karo Syrup packaging line at Argo, Ill., amply illustrate the value of plant engineered packaging line accessories.





3 **FALLEN BOTTLES** eased off the line. Photo shows one about to drop into receptacle, as upright bottles continue by. Sketch illustrates how star wheel "takes" the "ups", rejects the "downs."

Let us follow the Karo Syrup line, note the additions in sequence, and measure their contributions to line operation:

1—Cleans Bottles, Collects Dust

Before filling, bottles are labeled and then cleaned inside. Removing dust and fibers from empties is considered of such importance that a special cleaning machine—(A) in lead photo—was designed and built at the plant.

2—Bottle Breakage Balked

Second addition to the line, a foreseeing—forestalling type of auxiliary—(B) in same photo—is both small in size and cost, yet essential in the function it performs. It senses when bottles begin to congest and back up on the conveyor that runs in U-shape from cleaner (A) to filler (C). It then interrupts feed to the former.

Pressure on both sides of the twisters at entrance and exit of the cleaner would cause glass breakage, and the clean-up operation would delay production.

Control mechanism which prevents bottle-smashing jams operates in this manner:

At the back-pressure detecting station, conveyor guide rails (see sketch) are extended away from the track on one side. Over this area, but clear of the track, is a hook-shaped control arm which, when moved in the direction of the bulge in the guide rail, operates a microswitch.

Normally, bottles ride the conveyor past the bulge location. Back pressure, however, forces the bottles sidewise against the curved-out rails, at the same time advancing the control arm to operate the electric control.

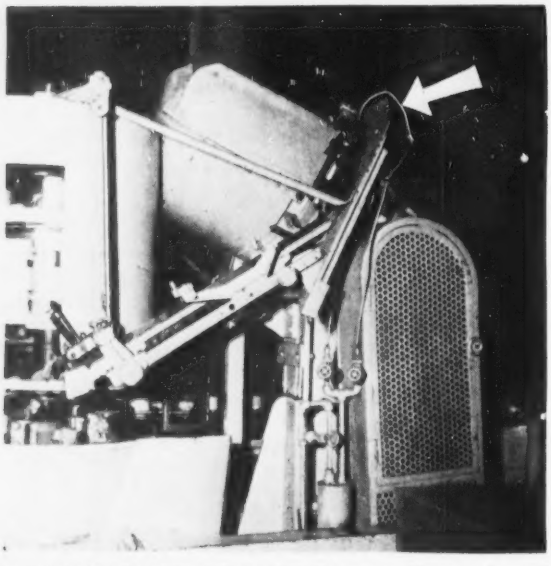
Actuating this switch stops the labeling machine that feeds onto the cleaner conveyor. Only when congestion is relieved can the switch close, again safely permitting feed to the cleaner.

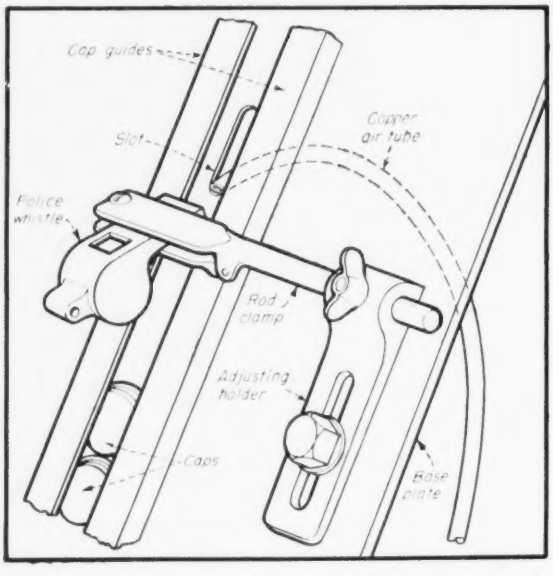
3—Removes Fallen Bottles

Installed ahead of the filler is the next attachment, also a detecting-correcting device. It removes from the conveyor any bottles that are not upright. Thus eliminated is a source of bottle breakage at the filler.

Employed is a star-wheel that is rotated by the curved sides of passing bottles—see photo and sketch, group (3). However, a bottle lying on its side does not fit into the grooves in the wheel and is therefore shoved sidewise by the wheel points. It then goes through an opening in the guide rail, off the conveyor, and into a cage-like collector.

By elevating the guide rail over the fallen-bottle discharge-opening (photo) so as to bear on the shoulders





4 **WHISTLE** "sentinels" flow of caps—blows when they're not coming. Arrangement on equipment is seen left, working details right. A second air tube (arrow in photo) acts as a flow booster.

of the bottles, upright bottles remain on the conveyor.

4—Capper Feed Warning Whistle

Ingenious is the use of a policeman's whistle—sounded by a blast of air from a copper tube—to shriek a warning when bottle caps cease to flow down the feed chute to the capping machine. This signal provides ample time for an operator to relieve the jam and thereby renew the flow of caps before the feed magazine is empty.

Here is the "how" of the simply constructed warning arrangement:

A slot (see illustrations) approximately ⅜ in. wide and several inches long was cut in the bottom of the cap chute, half way between the guides. From the flattened end of a length of copper tubing, air is directed through the slot and into the mouthpiece of the whistle.

Inclination of the whistle is adjustable, also its distance from the air outlet. Whistle is held securely by a laboratory type rod-clamp. Latter can be rotated in its holder and anchored in place by a wing-headed bolt.

Position of the rod holder, which is attached by a bolt through a slot, can also be adjusted to place the whistle in the stream of air from the tubing.

So long as the flow of caps down the chute to the capper is constant, air stream does not reach the whistle. However, in event of a jam, caps no longer intercept the air blast—and the whistle shrieks a summons to operators.

This warning arrangement offers still another advantage:

When flow of caps is interrupted permanently, due to a jam, the whistle emits a continuous piercing shriek. Most interruptions, however, are only temporary, and the feed mechanism breaks the jam unaided. When the whistle's shriek changes to a "tweet-tweet-tweet," operators know that the caps are again moving. Whistle is silent when magazine and feed are full and the flow of caps uninterrupted.

A second copper tube (arrow in photo) directs a jet of air against the caps to boost their flow down the chute.

5—Automatic Loose-Cap Remover

No longer is there a possibility of a bottle with a loose cap being packed, later to leak in the case. Simply constructed loose-cap removers, installed on all lines from capping machines to case fillers, now unscrew loose caps.

Device consists of a 3 ft.-long rubber water hose—(A) in photo—of approximately 1¼ in. dia., mounted on a metal-rod core (B). By means of nuts (C), threaded on the core rod on both sides of a pair of supports, roll position can be adjusted to extend over the conveyor at cap height.

With this arrangment, caps slide along the rubber hose as bottles are conveyed to the case-filling stations. Friction between bottle cap and hose is sufficient to unscrew and remove caps that are not well seated.

Occasionally a loose cap, though unscrewed, will nevertheless remain in place on the bottle. To prevent any of these loosened caps from riding past inspection, a permanent magnet (D) is suspended above bottles at the end of the rubber to pull caps off.

6—Fewer Code-Type Changes

For use on rotary type coding devices, flexible snap-on rubber dies with one or more mortises (not illustrated) are used for marking product name on universal shipping containers. Also for putting on identifying batch marks and various other coding.

No tools are required to mount and position these dies, thus replacement time is saved and an unpleasant task is required less often.

From labelers to automatic case fillers, Karo Syrup packaging lines operate efficiently at acceptable speed—and no small credit for line performance is due these auxiliary units and attachments applied by personnel alert to smooth operation needs.

They have aided in maintaining a clean and sanitary packaging area by collecting dust and reducing bottle breakage. They have upped line performance. And they have lowered maintenance and reduced packaging-line downtime.

5 NO MORE LOOSE CAPS. They're unscrewed and removed by this set-up, and magnet insures action. Rubber hose (A) on metal-rod core (B) rolls them off. Nuts (C) permit adjustment of device, and (D) is the magnet.

SURPLUS baked goods are loaded into freezer. Inventory thus built up enables baker to make deliveries six days a week.

In going from 6- to 5-day work week, baker freezes surplus goods to assure deliveries on a 6-day basis. Also achieves better product uniformity and production flow. Workers are happier, and output per man-hour is increased

Freezes *to Level Off* Production

HERMAN TYOR

Secretary-Treasurer, Wheatality Baking Corp., New York City

Several years ago, a labor contract put our bakery employees on a 5-day week.

This quickly presented a problem—how were we going to deliver fresh merchandise six days a week?

Initially, the only solution seemed to be adoption of a stagger system. But this proved unsatisfactory, particularly when experienced, absent employees had to be replaced by less experienced workers.

As a result, product uniformity and production flow suffered. Also, the morale of workers was poor when they weren't off on consecutive days.

Because of resulting higher labor costs and lower production per pound per man-hour, we had to find another solution—and we then hit on a good one: Building up an inventory during a 5-day work week by freezing overproduction baked goods.

Advantages of Freezing

This new practice has enabled us to increase the pounds of products produced per man-hour by 5.6 percent. Also, a 1-percent drop in labor costs has been achieved, although all plant personnel received a 10-percent increase in wages.

From a production standpoint, freezing baked goods is a simple operation. Only production change required is the method of handling cakes prior to shipping.

Freezing has paid off handsomely in other ways. We have not lost customers or sales. Formerly, sales fell off due to such situations as receiving special orders or requests from customers when we were short of cakes. Net figures do not show losses due to over- or under-baking in event of drastic weather changes.

Production is now planned far in advance of receipt of orders, particularly for holidays or special events. Also, it is much easier to bake a larger variety of items.

All employees are now working a straight 5-day week—Sunday to Thursday. More time is available for maintenance and clean-up operations on the two off days.

Workers and unions affected report a sharp pick-up in employee morale. The right man is available for the right job every day the bakery is operating. More uniform quality products are being produced. Our customers told us so. And overtime has been held to a minimum due to production planning.

Moreover, labor turnover has been reduced, and we find it easier to hire high-caliber employees.

A few words about our operation: We service about 2,000 restaurants, schools, hospitals, luncheonettes, and industrial cafeterias in the New York City metropolitan area with 75,000 to 100,000 lb. of cakes a week. Our customers are open six, and in some cases seven, days a week. And they expect deliveries six days a week.

Items baked in our wholesale bakery include Danish pastry, sweet goods, fried items, muffins, layer cakes, and the like. Cakes are packed in set-up newsboard boxes. Few items are wrapped in transparent films. However, Danish pastry and coffee rings are wrapped in cellophane or polyethylene.

Preliminary Freezing Tests

We believe freezing has a place in every bakery—wholesale or retail. However, it's use as a production tool must be carefully investigated.

Factors to study involve the various items, methods of packaging, number of days to bake and to deliver, system of delivery, financial savings, quality of products, and advising of customers regarding the production change.

Before installing a freezer, we carried out hundreds of tests over a six months' period. Products were frozen in a freezer holding 40 doz. cakes, which were then evaluated on an impartial basis by our sales department and customers. Each frozen product was defrosted and compared with similar unfrozen merchandise, in exactly the same condition of freshness as when they are sold.

Cakes were frozen—boxed and unboxed—at −30, −20, −10, 0, 10, and 20 deg. F. Different fillings and finishings were separately checked on the same type of cake.

Outcome of Tests

This preliminary work indicated that optimum results can be obtained by freezing at −10 deg. F. and holding at 10 deg. F. Possibilities of a bakery having facilities for a two-temperature operation are not common. It is certainly not the case in our bakery. Further investigations revealed that 10 deg. F. was best for a combination freezing-holding unit.

Unpackaged and unboxed cakes freeze and defrost faster than packaged items. Freezing did not result in losses in the weight of products or in flavor. And products can be defrosted and refrozen, provided no staling action has started.

In Goes a Freezer

Our preliminary tests justified the installation of a freezer that would enable us to work a straight 5-day week. We anticipated the amount of frozen merchandise required to fill orders for a 6-day delivery. An inventory is now built up during the 5-day work week to meet delivery requirements. This, of course, is a minor production problem, which is solved by over-baking each daily order requirements to fulfill 6th-day needs.

Factors considered before the installation of a freezer were: (1) Amount of merchandise to be stored, (2) type and capacity of rolling equipment and shelves, (3) size of freezer, (4) details in the construction of the freezer, (5) mechanical refrigeration equipment, and (6) available repair service.

We decided to install a 9½x10x20-ft. freezer, with a 5-hp. compressor and automatic defrosting-type blowers. This unit has a heavy duty metal-covered door, and it is built of cement with 6 in. of cork insulation on top and sides. Inside and outside walls are finished with 2 in. of cement. The floor was excavated to a depth of 14 in., and then a base of 4 in. of cement, 6 in. of cork, and 4 in. of top cement was laid.

Floor and wall intersections were coved for sanitary reasons. Guard rails now prevent damage to walls by racks. Shelving was constructed 6½ ft. above the floor and along both sides of the freezer. This slat-type shelving permits circulation of cold air.

A thermostatic alarm sounds in event of mechanical failure. And 24-hr. repair service is available in case of a breakdown.

In our case, several thousand dollars of merchandise are stored toward the latter part of the week, and protection of these goods must be insured by availability of prompt repair service.

It is best to store items in the freezer as soon as they are reasonably cool or near room temperature. Cakes must not remain too long on the floor, otherwise product staling commences.

About 1 man-hour is required to empty our freezer and approximately 4-5 to fill it.

Need for Special Racks

We constructed special racks, each holding 48 standard 18x26-in. bun pans. Each pan holds 3 doz. Danish or sweet dough items, weighing approximately 2½-3 oz. each. Between each row of pans, there is 4 in. of space to permit air circulation during freezing and defrosting. These racks are well constructed, with large casters to insure easy handling.

Upon checking with various oil companies, we were advised that special greases were not required for the casters when racks were held in the freezer.

Some items are boxed and then stored in the freezer on standard 10-shelf bread racks. By removing all but the top, bottom, and center shelves, the rack holds at least 150 boxes of Danish pastry with sufficient air space between them for reasonably fast freezing and defrosting. Naturally, this method of stacking will not allow the cake to be frozen or defrosted as quickly as the open-pan method.

A good inventory system is necessary, because it is more difficult to locate products in a freezer. All racks are now numbered, and an inventory is kept of each rack. Here, many simple systems are possible. At any rate, at least one of them should be used when starting a freezing operation.

Adequate clothing should be provided for employees working in a freezer, and management must insist that they use it. Army surplus clothing is satisfactory and reasonably priced.

A freezer with a correct rating will freeze Danish pastry and sweet doughs (2½-3 oz. pieces) in approximately 1 hr. Coffee cakes weighing 2-3 lb. take 2½-3 hr. to freeze. Coffee rings weighing ¼-1 lb. will freeze in about 1½ hr.

Products removed from the freezer are defrosted on racks in the packing room.

Defrosting time is influenced by room temperature, weight and density of items, and packaging. Boxed, 3-oz. pastry defrosts in 2-3 hr. in the summer and 5-6 hr. in the winter. Unboxed items of the same weight defrost in about 1 hr. in the summer and 2 hr. in the winter.

Handling Defrosted Items

If possible, it's best to sugar or ice goods after they have been thoroughly defrosted. If for production reasons it is more feasible to ice before freezing (and we do), use a high-fat icing. Incidentally, high-fat icings (such as fudge or butter cream) freeze very well and improve in flavor.

Regardless of season, some condensation occurred. But it had no noticeable effect on the products.

We use a wash consisting of sugar, corn syrup, and stabilizer. This is mechanically sprayed on baked goods immediately after they have been removed from the oven. Employed is an automatic twin-nozzle sprayer mounted over a chain-belt conveyor carrying pans of baked goods.

A 60-mesh agar is used as the stabilizer, and the amount is increased in humid summer months for quicker setting. It is best to incorporate this stabilizer with a sugar and water in the first stage and then bring the mix to a boil.

No Need to Change Formulas

In freezing baked goods, we have not found it necessary to change either formula or make-up, or fermenting and baking operations. The only change was with yeast-raised doughnuts, which must be fried at a slightly higher temperature to form a little crust. A heavy crust tends to wrinkle after defrosting, and it spoils the appearance of the doughnut. The doughnuts are filled with jelly before freezing, but iced or sugared after defrosting.

We are freezing and storing Danish and sweet doughs, which are taken from the mixer as cold as possible and surface-washed with salad oil to prevent crustation. On the day the doughs are to be used, they are removed from the freezer and defrosted 4-5 hr. at room temperature. Doughs are then refrigerated in a 30-38 deg. F. storage box (85 percent relative humidity) until they are ready for make-up.

'03 to . . .

ORIGINAL PLANT was built in Le Sueur, Minn., in 1903, processed cream style corn. First pack of 11,750 cases was highly successful. And thus was started this processor's never-ceasing growth.

Why *Green*

Dedicated principles — precisely defined but flexibly executed — have keyed this company's fifty years of canning progress. Detailed here are the organizational sinews that have contributed to this solid development

LLOYD E. SLATER
Assistant Editor, "Food Engineering"

Throughout its first half century—encompassing growth from a small pioneer cannery of cream style corn in 1903 to its present pinnacle as the largest processor of peas and corn—Green Giant has buoyantly avoided the pitfalls of overexpansion and hazards of rapid growth in a sphere of processing that normally links conservatism with endurance.

What is behind such remarkably self-assured progress through an era dotted with depressions, droughts, and crop failures?

Undeviating company policies—a concentration on a few highly popular items . . . An integration of crop control with processing . . . An annual compulsory liquidation of pack at any cost. These have been guides on a well-charted course of growth.

But rough weather can founder the soundest vessel. So the real answer lies in this company's *piloting*. In short, its management has constantly worked to be astute and flexible enough to best the economic exigencies.

Astuteness—Webster terms this "the ability to *foresee* a result"—comes to a company through top-caliber men. Green Giant has made it a principle to seek after and develop such men in its management. Hence, its high score in "calling the shots".

Flexibility—for our purpose call it "the ability to act to prevent a *foreseen* result"—is a more elusive quality for a large organization to develop.

Green Giant has achieved it through two deep-rooted policies:

1. It has stressed decentralized authority in its nation-wide multiple plant operation, yet has retained broad central control. In other words, divisions and plants "run their own show" as far as possible, but all conform to company principles.

2. It has fixed the responsibility for each function "down to the minute" and has assigned authority to individuals compatible with their jobs. However, to avoid inevitable conflicts, the company also strictly specifies only one administrative "boss" for each employee.

There you have it. All the benefits of central government, coupled with muscular self-determination by regions—and minus the bewildering bureaucracy that often mars balance.

Before probing into the working setup of the organization, let us note four of its specific tools. These are the *Policy Book*, *Organization Manual*, *Operating Manuals*, and *Employees' Handbook*.

Issued about two years ago, the 54-page company policy manual is retained by people of plant management level on up. It also is distributed to brokers, salesmen, some bankers, and stockholders. Clearly written and well illustrated, it outlines current company policy, both broad and specific, and tells the "why".

The organization book carries a comprehensive analysis of the responsibility of every job classification in the company. It is retained by each department head.

Up-to-the-minute revisions from engineering, research, and the methods department are constant additions to the operating manuals, which are held by each plant manager. These delineate company know-how in all manufacturing and plant operating procedures.

MODEL PLANT is company's Glencoe, Minn., facility, seen here from air. It processed 1,000,000 cases of peas and corn last year. One of 27 canning units, Glencoe was completed in 1949.

Giant Grows

Finally, each worker receives the employees' handbook, which details facts about pay, working conditions, insurance and benefits, etc. This 34-page book does much to answer grievances before they arise.

Management Committees

Common denominator for the carefully defined policy of decentralized authority is the management committee setup in headquarters, regional locations, and plant locations.

In Le Sueur, this group reports to the company president. It consists of eleven members—the executive vice-president; the vice-presidents in charge of production, finance, sales and advertising, and personnel and public relations; director of traffic and shipping; director of research; director of sales; two divisional managers; and the president.

This committee has high administrative authority. It can establish any major policy change, decide on new construction, and handle land purchases. Recommendations to it may come either internally or be submitted from anywhere in the company. In any case such recommendation must be signed by a committee member.

This Le Sueur committee meets each Friday. And the practice is to discuss and vote on every current recommendation before adjourning.

A like committee holds forth weekly in each of the four company production divisions—Minnesota, Wisconsin, Iowa, and Blue Mountain (Pacific Northwest).

Divisional committees are composed of administrative staff members in the divisional headquarters plant. For example, the committee may include the comptroller, personnel manager, purchasing agent, quality control manager, engineer, and field "super".

This committee has full administrative control within the area. However, major developments, such as expansion, land purchase, and new facilities, must also clear through the Le Sueur group.

At the plant level, a management committee also meets once a week. Headed by the plant manager, this type group includes supervisors of factory, field, farm, employment, and office.

In-plant improvements, personnel problems, need for new equipment, and the like, are all subjects for discussion at the plant-level meeting. Purchasing decision can be made for local supplies and emergency equipment. Also, money may be assigned for donations and local community work.

"Painting the Floors"

One of the most dedicated company policies is its annual liquidation of production—or, as the company terms it, "painting the warehouse floors between packs". Its broad but integrated organization structure aids greatly in this objective.

It is the company's belief that a pack carry-over presents undesirable

Half Century *Young*

Starting with a small new factory in Le Sueur in 1903, Green Giant Canning Co. now operates 27 canneries through the U.S. and Canada.

But growth has not been the only outstanding aspect of the company.

It has pioneered in selective breeding and crop control . . . It was among the first to vacuum pack corn and extend can sizes to fit small and large family needs . . . And its progressive personnel-relations policies have been a model for the industry.

Here's to many more half-century jubilees for this forward-looking food processor.—*The Editors*

speculation as to conditions of cost and market in the succeeding year. But liquidating a pack can be an expensive business if the costs of that pack and its size are out of phase with the current market.

To meet this situation, the company depends on its broad, flexible organization, which spreads the crop risk geographically and minimizes the danger of widespread variations in one area. Thus, it has 27 plants in carefully selected growing areas in eight states and two provinces of Canada.

Because of this regional spread it is possible to avoid further increase in productive capacity until normal or sub-normal crops or increased consumer purchases adjust supply to normal pattern. Also, stock shipments can be planned—i.e., company shipments cleanup, 10 months; dealers, 10½ months; retail stocks, 11½ to 12 months.

However, when a large increase over planned production occurs, or when advisable from a sales standpoint, there is a step-up in sales and consumption through price adjustments and extra promotion or advertising.

Closely tied in with this production-price-promotion flexibility is a system of budgetry control extending right down to the supervisor level. Close adherence to a carefully drafted operating budget in each plant—and progress reports during the pack as to adherence to this budget—permits an estimation of profit at current market levels. This, of course, provides indication of what can be afforded in the annual liquidation effort.

Budget Control

According to Green Giant thinking, budgeting is prior planning of what they are going to do with the money they expect to receive. Drawing up a budget starts with the supervisor. And he will be required to live within his estimates.

After budgets are accumulated throughout the company they are analyzed and approved, first by the staff department head or divisional manager involved, then a central budget committee. Next, the management group passes judgment at a special meeting, and the salaries and budget committee made up of non-employee directors screen the budget before its final submission for approval by the board of directors.

Essentially, the yearly budget is divided into three categories—operating, capital expenditure, and cash. The first named, which includes all income and expense of the current year's pack, permits a vital comparative check of results with varieties, manner of packing, overhead costs, etc. Most important of all, it gives an estimate of profit—provides a clue of what can be done under certain market conditions.

Drawing up the capital expenditure budget—requests for replacements, new equipment, land, buildings, insurance, and so forth—is a selective problem. Here, items of doubtful or short-term value are carefully pared. After this important budget is fixed, requests for additional appropriations must be backed by executive approval.

The cash budget is a compilation of all items affecting income and outgo of cash, and it makes possible a close indication of how much short-term credit must be obtained so that credit arrangements can be made in advance.

As such, the thoroughly documented budget in the hands of management committees prior to and during a pack is a valuable tool for decision. Providing close control of operations and working capital, it is a dynamic yardstick as well as means of forecasting things to come.

Before leaving the subject of budget, an important factor concerning this document—cost control analysis—might be briefly mentioned.

During packing operations, each plant is required to draw up a complete daily profit-and-loss statement. This includes direct variable costs, such as labor and produce, and fixed overhead expenses. These are then summarized for the division and company as a whole and issued as a "yellow sheet." Included here are matters of skipped acreage, unexpected expenses, unplanned pest control, market changes, and regrading.

Other cost analysis reports are made on farming and seed operations and also the year-'round costs of labeling, advertising, and warehousing. All cost data are available to factory and field superintendents and higher level executives.

Behind the Growth

Actually, the phenomenal growth of the company has been highly selective and almost cautious in manner.

For while growth itself is a deep-seated company philosophy, expansion has only followed very thorough and conclusive proof that a definite market was available.

A major spurring factor has been the spreading of the crop risk by producing in widely scattered geographical areas. Thus the company operates sizably in the Northwest as well as throughout the Midwest, and it has now extended to the East (Delaware).

However, another basic company policy has somewhat put a lid on expansion. That is its decision to stick to a few products and strive to be an important factor in that particular market. Thus, when any new product is considered, management insists that it must promise to capture at least 10 percent of the national market, also that at least half of the proposed item is suitable for the Green Giant label.

Plenty of preparation and analysis precede a company expansion into a new area. When a possible site is under consideration, it is first checked on all phases of production, such as its soil type, climate, insect life, labor population, available water, sewage facilities, shipping rates, local prices.

Then, if the location rates well the desired plant size is calculated and an estimated working budget is drafted.

When plans have reached this point, a crew of company experts are sent into the region for closer testing. Thus a plant breeding expert would make on-site studies of the local produce for desired varietal characteristics, and an agronomist would check aspects of soil fertility and crop yields.

Finally, when the decision is made to build, the company sets a standard on its pre-estimates by requiring that the new facility meet its assigned operating budget by the second year.

G.G. Pow-Wow

Typical management meeting gets under way at Le Sueur headquarters. Periodic affairs, these gatherings bring together the top bosses of the several Green Giant operating divisions to set high company policy.

NEW MEAT-PACKING PLANT is specially designed for direct-line flow, accelerating production of quality items.

Modernization Triples Its Output

Boston meat packer's new plant emphasizes speedy materials handling, increased efficiency, and better sanitation. Featured are new smokehouses, frank-skinning units, advanced packaging

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

Uppermost in the minds of planners at New England Provision Co., Boston, was the engineering of better efficiency and sanitation in the company's new meat-packing plant.

Fact that the old building was in the path of a highway project had spurred the move to modernization in a new structure, and Nepco executives were determined to make the most of their opportunity.

Resulting today is a spanking new two-story facility permitting a high-production performance of 750,000 lb. weekly of Nepco sausage products—triple the capacity of the former building.

Located in the New Haven Railroad's new market district, this eye-catching, 56,000-sq. ft. plant boasts five notable innovations designed to take deep bites out of production and maintenance costs—

1. Use of stainless steel equipment and tile walls wherever possible.

2. Straight-through movement of product from mixing, to stuffing to smoking departments.

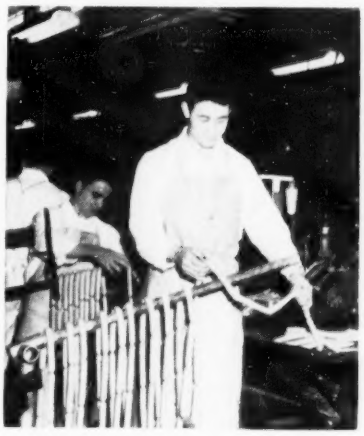
3. Bank of 10 triple-duty air-conditioned smokehouses, automatically controlled from a central panel.

4. High-speed frankfurter skinning and packaging line.

5. Advanced prepackaging of uniformly sliced luncheon meats, sealed at peak of freshness in ½-lb. units.

Now to track down these marked meat-processing improvements:

With the use of stainless steel smokehouses, curing vats, dump buckets, and packing tables, clean-up operations have been greatly facilitated. Tile walls throughout process areas portray management's farsightedness in targeting economical, yet sanitary operations. Easy-to-clean Neoprene conveyor belts have been installed in the meat-cutting and packaging departments. Also, air-conditioning units in key processing rooms enable production of uniform quality sausage-meat products.



SMOKE-STICK holders support sticks around which franks are looped.

A 35-deg.-F. holding room is designed to hold six carloads of beef. And a 0-deg. freezer provides storage facilities for 3,000,000 lb. of surplus trimmed meats.

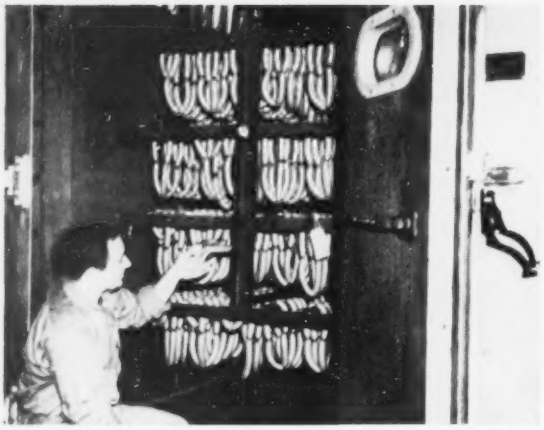
Housed on the first floor are the cutting and curing rooms. In the first there are two 40-ft. traveling-belt cutting tables for boning carcasses and trimming meats. Adjacent to this room is the curing room. Here, corned beef, tongue, rolled beef, and pastrami are cured in 32 stainless steel vats, each holding 3,000 lb.

Snow-ice for chilling sausage-meat products prepared in silent cutters is made by a 5-ton per-day machine.

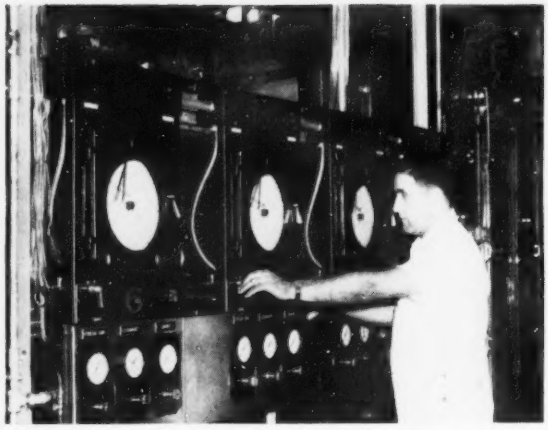
A completely enclosed heated loading platform is provided for ten trucks that distribute Nepco products throughout the New England States and parts of New York.

Accent on Handling

Flow of products through the plant is systematic, with advanced handling methods saving labor. Carcasses are now received from a railroad siding—an arrangement that was non-existent in the former plant. Stored in the



IN THIS 3-in-1 smokehouse, products are smoked, cooked, and rinsed. Attendant checks internal temp. of franks.



CONTROL panel, which automatically regulates battery of ten stainless-steel smokehouses.

cooler or freezer, the carcasses are conveyed to the cutting room. Trimmed meats are loaded into 500-lb.-capacity stainless steel mobile trucks, which are moved via freight lift to the second-floor sausage-preparation room.

Specialty items—corned beef, pastrami, and rolled beef—are initially transported to the curing cellar, later to be moved via mobile truck and elevator to stainless steel, gas-fired smokehouses.

Feeding of ground meats from weighing station to four silent cutters has been specially engineered. Employed are two 400-lb.-capacity stainless steel buckets, which are opened at one end to simplify loading and unloading. Each bucket is pivoted to a metal frame suspended from a trolley riding on a circular, overhead monorail. Closed end of each bucket is secured to a 1-in.-dia. notched rod to prevent tipping during travel between rail scale and silent cutters.

Chopped, mixed sausage meats are hauled in 500-lb. capacity stainless trucks to a cooler room (35 deg. F.) adjacent to the stuffing department.

By hooking up two 500-lb. capacity sausage stuffers with a T-shaped discharge pipe, operation of four machines for string-tying skinless frankfurters into links is now continuous. This is possible because one stuffer can operate continuously while the other one is being filled with meat.

More Efficient Stuffing

Wiener meat stuffed into natural casing is automatically twisted into links by a machine on still another line.

At the end of each linker are two specially designed smoke stick holders. Each supports two sticks around which the linked frankfurters are looped to facilitate loading the cages. Used for the holders is 2-in. dia. vertical pipe. One end is secured to a circular metal floor stand so that it can be rotated. Two cup-shaped receptacles at the top of the pipe hold the sticks. As one stick is loaded with a strand of wieners, the pipe is turned to permit loading of the second empty stick. Meanwhile, the loaded stick is placed in a cage and replaced with an empty stick.

Hooked up with a stuffer is a company-designed unit for filling 6-lb.-capacity molds for loaf meats. Rectangular metal molds are first lined with stockinetting and then placed in a patented loaf-mold holder. A hand-operated screw clamp secures the mold in the holder. Meat is then forced under about 90 psi. through a special stuffing horn and into the mold. At one side of the mold holder are two vent pipes to release air pressure.

A rectangular metal lid is clamped onto the mold after it is removed from the holder. Loaf molds are loaded into mobile trucks to be transferred to four double-section cooking tanks, each tank holding 600 lb.

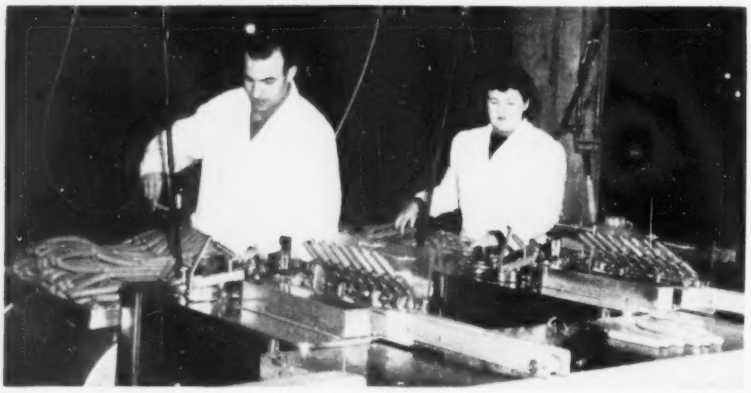
Automatic temperature controls are pre-set at the desired cooking temperature. A steam valve then automatically opens and heats the water in the cook tanks. An automatic timer is also set to flash a red light on the control panel at the end of the cook.

Triple-Duty Smokehouses

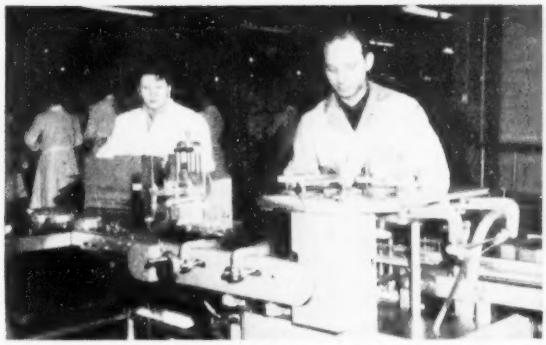
Smoking, cooking, and showering frankfurters and similar items are now achieved in a battery of 10 six-cage one-story Julian smokehouses. Each cage holds about 250 lb. of wieners.

These all-stainless houses have been modeled to reduce former multiple handling of cages from obsolete smokehouses to steam house and then to shower. And by installing these new efficient smokehouses, floor space amounting to five smokehouses has now been saved. Also, a notable savings has been attained by employing overhead monorails for moving cages in, through, and out of smokehouses.

Aside from handling and floor space savings, these stainless steel houses are easier to clean. The metal does not corrode or accumulate grease and creosote. Moreover, sloped tile floors permit drainage of wash and clean-up waters.



NEW machines that automatically strip casings at rate of 65 franks a minute.



PACKAGING line turns out 60 ½-lb. packages of sliced luncheon meats per minute. Left photo: Machines slice, count, and stack meats. Right photo: Stacks of meats are machine-wrapped in heat-sealable cellophane.

Product uniformity is accomplished by pneumatic temperature and humidity controllers. One operator, working at centrally located control panels runs all 10 smokehouses.

Operation of a smokehouse is carried out in this manner:

Smoking is the first step. The operator initially starts the motor driving the instrument chart. Next, he presses a button to open the steam valve on the back of the smokehouse. Steam flows through a bank of coils, and two 20-in. fans blow hot air through ceiling-level ducts with outlets along both sides of the house. Meanwhile, the instrument-control point is set to the desired temperature.

After dry-heating 10-15 min. (depending upon the product), smoke is emitted from a central generator through the hot-air ducts. Smoke is introduced into the house by setting a dial on the instrument panel to the amount of smoke required.

During smoking, a second instrument setting is made, this time for the desired humidity. If there is too much moisture in the house, an exhaust fan is started to pull air out of the house via a damper.

After the meat is smoked to the desired color, the temperature control is cut off. Then the exhaust is opened and fresh air clears the house of smoke. Finally, the blower is stopped and the dampers are closed.

Before cooking—the second step—the operator opens the smokehouse and inserts a needle-point thermometer into one of the frankfurters. A reading of 130-140 F. internal temperature assures a properly smoked product.

To start cooking, the house is closed and a three-way valve on the instrument panel is turned to the cook position. The temperature controller is now set to the desired cooking point. Live steam then enters the house through ¾-in. perforated pipes set at a 40-deg. angle and about 4 in. above the floor and along three sides of the house.

A timer flashes a red light at the end of the cook. Temperature control is then cut off, and the steam valve automatically closes. Steam heat is removed by operating the blower and then sending fresh air into the house. These operations are actuated at the control panel. Internal temperature of the product is then again checked with a needle-point thermometer.

Final step is showering the smoked items. By operating a hand lever alongside each house, water is introduced through four ceiling-level pipes, each containing a dozen spray nozzles.

Skinning and packaging of about 200 frankfurters per minute is now being accomplished on a 50-ft. packing line equipped with three Ty-Peelers (Linker Machines, Inc.).

Automatic Wiener Skinners

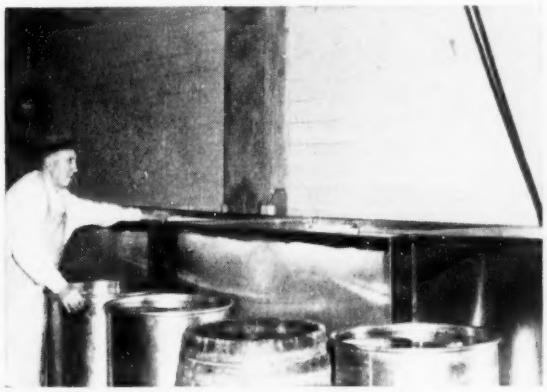
These new machines automatically strip cellulose casings at the rate of about 65 franks per minute per machine. Here's how:

Frankfurters are removed from cages and placed on a feeding tray mounted on the stationary casing-collecting drum. Each row of franks is now fed to the skinning machine, where it first passes between a pair of horizontal Formica rolls (2-in. dia.) on vertical shafts. Franks continue over three 3x¾-in.-dia. stainless steel rolls and then through another pair of Formica rolls.

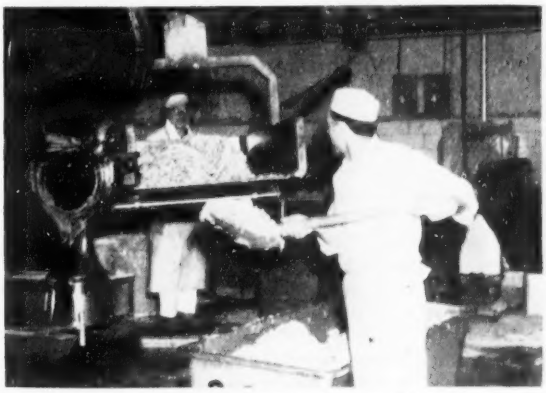
The latter are set at about a 45-deg. angle to guide the wieners to a pair of reciprocating vertical knives. The first knife severs the franks at the points where they have been linked, and the second one diagonally slits the casing at the end of the wiener.

Still another pair of 3-in.-dia. Formica rolls guides individual frank-

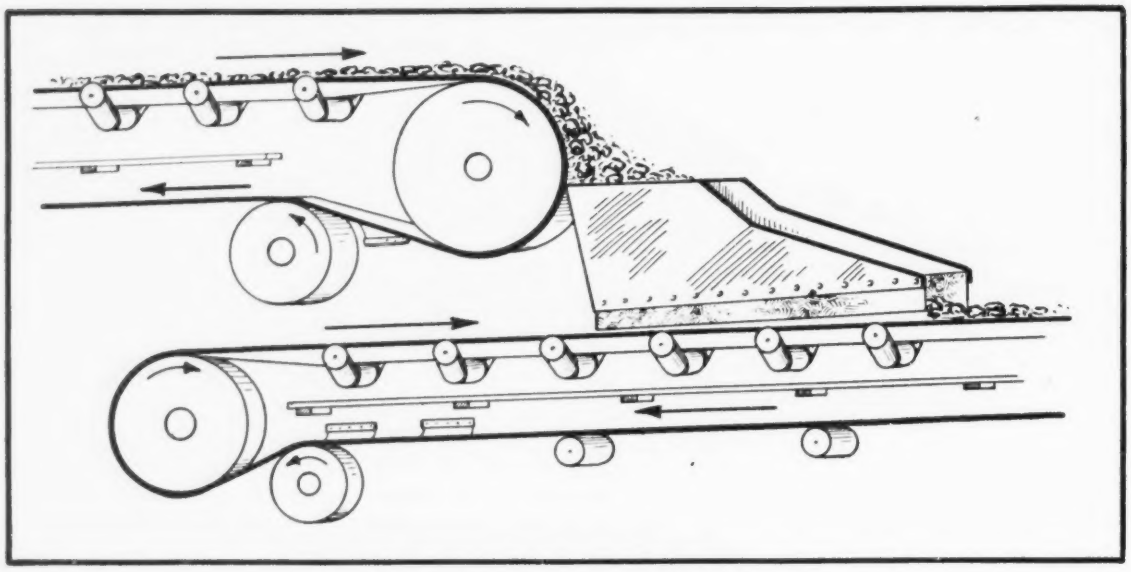
(*Turn to page* 188)



SANITATION gets accent in curing cellar. Note gleaming tile walls and stainless steel curing vats.



MONORAIL-MOUNTED dump bucket whisks the ground meats from track scale to silent cutters.



Major Components in a Belt System

CARE of your belt for longest life is dependent upon attention to such points as illustrated here: Minimum drop of material from belt to belt; adequate number of idlers around chute; proper length and spacing of flexible skirt boards.

Selection and Maintenance of

Rubber Conveyor Belting

Here are guiding factors on these belts—proper widths, number of plies, loading conditions, capacities, critical wearing areas, pre-installation handling, methods of repair, and life expectancy

FRED MATHEIS
Assistant Vice-President, Thermoid Co., Trenton, N. J.

When materials handling efficiency is your target, choice of the correct type of belt from the many available is of vital importance.

Initial considerations should relate to the task to be performed—such matters as size, density, and sharpness of the pieces of material to be carried.

Large pieces of heavy material in sharp fragments will require a belt with a thick cover, breaker strip, and several plies with skims. Light, fine material can travel a less rugged belt.

Allowance must be made, too, for extremes of temperature of both material and working environment. Belts can be supplied for both hot and cold materials and climates. Moisture content of the material is also important. For wet and dry mixtures take different belts.

Material in fine sizes, if abrasive, may require a heavy cover in spite of the small particles. In some instances belt color is important as for giving contrast to aid in inspection of materials carried.

How Wide?

Size of the belt is dependent upon the rate at which material is to be moved, the distance, and horsepower required to move the load.

It is axiomatic that, for a given tonnage per hour, the faster the belt travels, the narrower the belt required. However, the faster the belt runs, the more often it will pass the loading point and the greater will be the wear and maintenance.

In the long run, it does not pay to save on the first cost of conveyor belting by running a narrow belt at high speed. And, conversely, the capital cost of belting will be excessively high if a very wide belt is run at relatively slow speeds.

A break-even point should be calculated, and here a great many factors must be accounted for. For example, a high-speed belt requires more expensive rollers. On the other hand, a wide, slow speed, belt will take longer rollers which may be just as expensive. Also, the high-speed rollers will require more attention after installation. Fortunately, there are many tables, formulas, and standard practice guides to assist the engineer in making his choice.

A well-proportioned belt has enough plies to support the load and withstand tension. It must be flexible enough to trough and bend over pulleys without excessively stressing the belt. In general, the minimum ply belt to support the live load also satisfies tension requirements. On flat travel over short distances, the belt operates below tension capacity. Reference should be made to manufacturers' tables and formulas in choosing a well-proportioned belt.

Attention to details of belt construction and operation is essential to prolonging belt life. Major points: Edges

HANDY FACTS ON BELTS

Today, there are numerous types of conveyor belts available for a wide variety of service. However, all belts are similar in construction, consisting essentially of carcass and cover.

The carcass is made up of one or more plies of cotton fabric duck. Lengthwise (warp) threads are woven over and under the cross (filler) threads, thus giving a distinctive elastic quality in the direction of travel. Warp threads provide the primary strength. Duck is specified by weight per linear yard (42 in. width), such as 28, 32, 35, and 45 oz.

When belting is to be subjected to severe flexing conditions, placement between the plies of a thin sheet of rubber, known as a "skim," is advantageous. Covers for conveyor belt are compounded of natural and synthetic rubber stocks, together with other ingredients, varying according to the service.

A smooth rubber surface is normally used and is furnished in various thicknesses to resist abrasion, heat, cutting, and gouging. For severe service, a breaker strip is inserted under the cover. This is an open-mesh fabric ply that increases cover adhesion for maximum resistance to cover separation. Although each ply of the carcass usually extends completely across the width, there is available a special type made up in step-ply construction.

Belt thickness is uniform, but a thicker layer of rubber may be provided in the center with additional duck plies at the sides. This construction is to be considered when there is extreme wear in the middle of the belt, as in handling abrasive materials.

As employed in industrial plants, the top cover of the belt is usually thicker than the bottom, since the former sustains the most wear.

Although the smooth-surface belt is the most widely used in food plants, other special belts are available.

The canning industry uses a belt with a white, acid-resistant cover that does not impart odor or taste. This belt can easily be cleaned to prevent accumulation of food in the pores.

Another belt is made for operating in temperatures from 270 to 350 deg. F. Here, the carcass is composed of specially treated glass fabric incased in a special heat-resistant fabric envelope. A ply of asbestos is added under the cover for additional insulation.

Recently, a rubber conveyor belt was designed for use in cooling hot cans of pineapple. This belt is characterized by alternately projecting integrally molded lugs which cause the hot cans to tumble and roll, in a stream of cold water.

A special bare-back belt is employed for conveying bread. Rubber "skims" are used in the carcass, but the covers are bare, white, cotton duck without any rubber covering.

"Ruff top" belting is characterized by a surface with thousands of gripper points of irregular shape. These prevent back-slip when conveying containers up an incline.

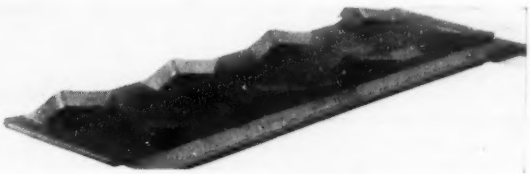
There is also the "flanged" belt, where the edges are built up to prevent material from falling off.

In cases where long belt are required by special conditions, rayon duck or rayon cord can be substituted for cotton in the carcass for extra tensile strength.

Typical Construction

Surface Types

For bulk products



For cooling of cans

For cartons

of all the belting are carefully sealed in manufacture to prevent moisture from entering. Excessive edge wear destroys this seal. Water will then attack the carcass, causing mildew and rot. If the water freezes, the ice particles will rapidly destroy the belt.

Edge wear is considered by many specialists as a chief cause of short belt life. Here, misalignment is a large contributing factor. It is absolutely essential that the belt carriers be correctly aligned. It pays to take considerable time to secure as close to perfect alignment as possible. Many installations are aligned with a transit. Reducing edge wear usually saves on power.

It is becoming common practice to cut off worn edges, before the belt has completely disintegrated, and then use the reclaimed, narrower belt in less severe service. New liquid Neoprene compounds are available for sealing the newly formed edges against moisture. Liquid Neoprene is also useful in building up worn spots in the cover to prevent more extensive repairs later.

Skirt boards are another primary source of edge wear. Their construction and placement must be carefully engineered by qualified personnel. The use of jerry-built, "baling wire" contrivances should be avoided. Fasten skirt boards firmly so that they will not tend to loosen and drag on the belt.

Loading conditions are a major factor in belt deterioration. The loading point is a danger zone. Both existing and proposed installations should be regarded with the intention of creating "ideal" loading conditions.

One of the basic requirements for long belt life is to have the material fall on the belt while moving in the same direction and at the same speed as the belt.

Material should be directed onto the center of the belt, not toward one side. Material falling on one side will make the belt ride out toward the other. As a result, the belt will not train properly and will rub against guard boards and training idlers (if used), increasing edge wear.

When lumpy material is being carried, an attempt should be made to have such material cushioned by a prelaid layer of fines. A screen, or "grizzly," at the bottom of the loading chute will satisfactorily deposit a layer of smaller material over the belting, thus providing protection against bruising. In some instances, an oval, or "fish tail," notch cut in the lip of the chute will aid in prelaying the fines.

At the same time, the velocity of loading-material flow should be controlled by pitching the loading chute properly. If this is not feasible, a baffle of iron or wooden bars should be constructed in the chute—suspended from the top and free-swinging at the bottom—to reduce the velocity of material flow onto the belt.

In like manner, the vertical distance between chute and belting should be small to prevent excessive impact of material falling on the belt. For this can cause belt damage, particularly where the material is lumpy.

Material should not strike the belt directly above a solid pulley. The resulting "hammer-anvil" action will quickly render the belting unusable. The chute should be located so material hits between idlers. However, in cases where heavy material is being loaded, it may be necessary to load directly over rubber-covered or pneumatic idlers.

In some cases, impact load between idlers will set up belt vibration, and this may depress the belt sufficiently to allow material to escape under the skirt-boards. This vibration may be prevented by locating the chute so that loading material will strike the belt far enough ahead of the tail pulley to allow insertion of at least one belt-steadying carrier pulley. In any event, carrier pulleys should be more closely spaced around the loading zone because of the impact action.

Chute Details

Construction of loading chute skirt-boards and flexible skirts should be carefully considered. Skirt-boards should not touch the belt, but should be positioned slightly above it. They should be long enough to settle the material before it leaves the loading area.

Flexible skirts are preferably improvised from rubber-covered edges of belting remnants. They should be placed so that the rubber-covered edge is next to, but not touching, the conveyor belt. Should this be reversed (exposed-fabric edge of remnant against the moving belt), grit will collect in the fabric. Resultant abrasive action will, in time, wear a track through the belt cover.

Vertical spacing between chute skirt-boards and belt should increase toward the open end of the chute. Thus the width of flexible skirts, as cut from a belt remnant, should decrease in the direction of belt travel. This minimizes spillage around the loading point. At the same time, wedged-in lumps of material will work themselves free by virtue of the forward motion of the belt.

Pre-Installation Do's and Don'ts

Belt maintenance begins even before the belt is installed. When first received it should never be dropped off the delivery vehicle but should be skidded, rolled, or lifted. A large roll of belt weighs several tons—which in a fall would hit with high impact over the area of contact, enough to weaken the belt. If the belt roll falls on a stone, tool, or track, a cut or puncture may result.

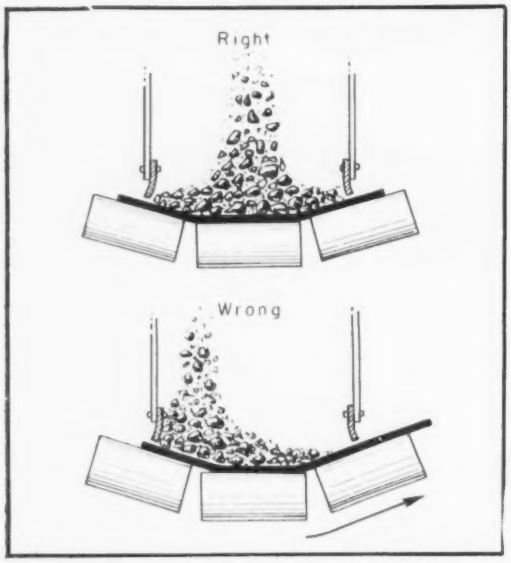
When not installed at once, a belt should be stored where it is not likely to be damaged accidentally and where it is shielded from sunlight.

For installation, threading of the belt over the idlers and pulleys is a critical operation in which the belt is vulnerable to much damage. More than ordinary care and planning are needed.

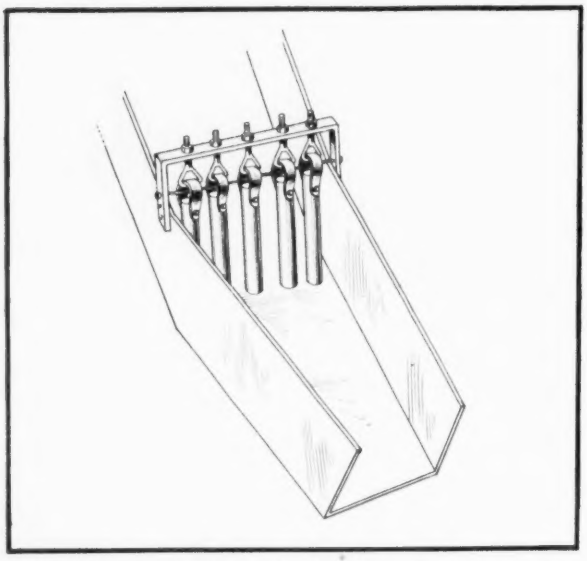
Here are tips: Avoid sharp bends. Minimize dragging over sharp rough

(Turn to page 139)

Loading Tips

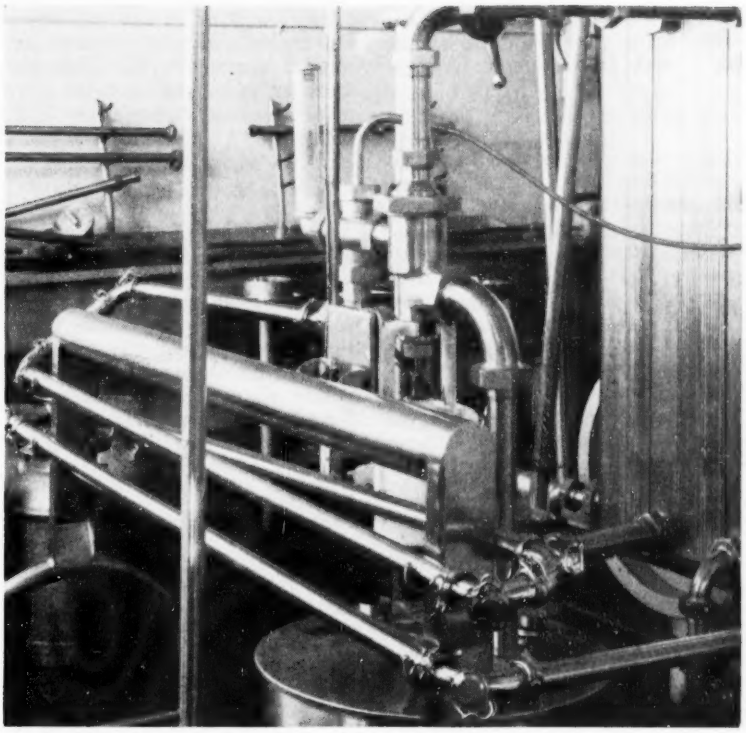


PROPER loading is onto center of belt. When offside, belt rides up in opposite direction, causing edge wear.



SUSPENDED BARS in chute slow down flow of material being delivered to belt when more gradual slope is impossible.

Proper temperatures, cleaning compounds, and flow rates give excellent results by recirculation. A little chlorine improves effectiveness of alkaline cleaners.



EXPERIMENTAL milk plant was equipped with new stainless steel pipe and special fittings that utilize permanent synthetic composition gaskets.

Cleaning Stainless Lines In Place

New Tests Point Up Best Ways

R. F. HOLLAND, J. D. SHAUL, D. A. THEOKAS and H. M. WINDLAN
Department of Dairy Industry, Cornell University, Ithaca, N. Y.

Provided the lines are properly installed and equipped with tight-fitting, non-absorbent gaskets producing flush joints, in-place cleaning of stainless steel pipelines and equipment can be very effectively accomplished.

For this operation, cleaning agents should be selected that are adequate to cope with the water supply available and types and temperatures of products handled. A circulating pump should be used that has sufficient capacity to maintain a minimum velocity of cleaning solution of 2½ ft./sec. or higher.

The study reported here was launched in Oct. 1951 for the purpose of determining whether or not stainless steel pipes and high-temperature short-time equipment could be cleaned in place, and what materials and methods would give best results with the Cornell water supply, varying between 5 and 7 gr. hardness.

Our experimental milk plant was completely equipped with new stainless pipe. And employed were Tri-Clamp fittings (supplied by Tri-Clover Machine Co.) utilizing permanent gaskets of synthetic composition. These are not absorbent to fats and give a tight, flush joint.

The installation enabled us to study lines handling cold raw milk, and hot (162 deg. F.) and cold pasteurized milk. A 3,600 lb./hr. HTST pasteurizer was also included in the system.

To answer questions concerning cleaning of pipes handling milk at higher temperatures, an experimental system was built. Included were a pump, an internal tubular heater, several sections of stainless pipe, recording thermometer, and supply tank. With it, milk could be maintained at any desired temperature up to 210 deg. F. and circulated as long as desired.

Twenty-six cleaning mixtures or combinations were studied.

Cold raw milk lines were cleaned by flushing with cold water until it ran clear and then circulating cleaning solution at 120 deg. F. for 15-30 min. Sterilizing solution or hot water (180 deg. F. +) was then circulated for a minimum of 5 min.

HTST pasteurizer, including holding tube, and the cold pasteurized milk lines were cleaned as a single circulatory system. The system was flushed with water until it ran clear. Acid cleaner at 120-170 deg. F. was then circulated for approximately 30 min., followed by flushing. An alkaline cleaner was circulated for a like time and at corresponding temperatures. Sterilization was accomplished by circulating chemicals or hot water (180 deg. F. +) for 5 min., except when quaternary ammonium cleaner-sanitizers were used. In this case no additional sterilizer was circulated.

Hot milk (200-210 deg. F.) lines were cleaned by flushing with cold water until it ran clear, then circulating acid and alkaline cleaning solutions for approximately 30 min., each

at approximately 160 deg. F., and sterilizing by sending through a chemical sterilizer for a minimum of 5 min.

Flow Rates

In raw milk lines and the experimental hot milk assembly, rate of flow of cleaning and sterilizing solutions was about 8½ ft./sec. In the HTST system flow rates were varied between 1 and 5 ft./sec. to determine what effect, if any, velocities had on cleaning efficiency. A cleaner combination that had proven satisfactory at the higher flow rate was used.

Solution pressures were also taken at discharge of circulating pumps, but since these pressures were directly related to rate of flow in the systems and to extent of systems, no attempt was made to correlate effect of pressure on cleaning ability. High pressures are undesirable from the standpoint of gasket distortion in the HTST pasteurizer.

Effectiveness of Cleaning

Three methods were used to judge effectiveness of the materials tested: Visual inspection; bacteriological swab tests for total bacterial and *E. coli* counts; and pressure swabbing of sections of pipe (approximately 8 ft. each) to remove deposits that might not be visible when looking through the tube. Lines were brushed or otherwise cleaned weekly if films were apparent.

Swab counts were made each week at eight points on each milk line in accordance with the method previously outlined.* A count in excess of three colonies per ml. of rinse solution was considered to be above maximum standard. This standard is probably far more rigid than is justified for practical control work. *E. coli* counts were made on desoxycholate agar, using 2 ml. of swab-rinse solution.

Pressure swabbing was accomplished by utilizing a special type of rubber stopper (A. H. Thomas Co. HR-108), which fitted snugly into the pipe. A No. 7 stopper is satisfactory for 1½-in. tubing, the size used in these experiments. A cloth patch just large enough

Food Industries Vol. 22, 1686-90, 1950.

TABLE I—RESULTS Obtained When Cleaning Raw Milk Lines in Place

Materials Used	Time In Use Weeks	Visible Soil[1]	Color of Deposit Swab Test	Sterilizer Used	Bacterial Data: No. of Samples	E. Coli Count	No. of Sterile Samples	No. Above Standard[2]	Percent Above Standard
Alkaline cleaner A[3]	8	++	Brown	Hot water	64	2	3	9	14
Alkaline cleaner B[3]	1	++	Brown	Chlorine	8	0	6	0	0
Alkaline cleaner A plus chlorine[4]	4	.....	.....	Chlorine	32	0	6	4	12
Alkaline cleaner B plus chlorine[4]	4	.....	.....	Hot water	32	0	8	4	12
Alkaline cleaner C[5]	5	.....	.....	Chlorine	40	0	22	6	15
Alkaline cleaner D[6]	2	.....	.....	Chlorine	16	0	7	2	12
Alkaline cleaner E[6]	2	.....	.....	Iodine	16	0	1	2	12
Acid cleaner A[7] followed by alkaline cleaner E	14	.....	.....	Chlorine	112	0	46	18	16
Acid cleaner A followed by alkaline cleaner E	4	.....	.....	Quaternary	32	0	6	11	35
Acid cleaner B followed by alkaline cleaner F	3	.....	.....	Chlorine	24	0	12	3	12
Acid cleaner A plus bottle-washing alkali	4	.....	.....	Quaternary	16	1	8	6	37
Acid cleaner B plus bottle-washing alkali	4	.....	.....	Chlorine	24	0	11	4	17
Acid cleaner-sanitizer	1	++++	Brown	Quaternary	8	0	2	0	0
Alkaline cleaner-sanitizer	7	++	Brown	Quaternary	56	0	4	13	23

[1] Number of plus marks roughly indicates quantity of soil.
[2] Maximum set at 30 per 10 ml. of buffer solution.
[3] High grade hand-washing compounds containing 10 percent or more wetting agents (ratio, 1 lb./30 gal. water).
[4] Four ounces 15 percent chlorine solution added to each 30 gal. water.
[5] Hand-washing compound with no wetting agents.
[6] Hand-washing compounds with 2–5 percent wetting agents.
[7] Acid cleaners were liquids with phosphoric acid base, used at rate of 10 oz./30 gal. water.

TABLE II—CLEANING Hot- and Cold-Pasteurized Milk Lines In Place

Materials Used	Acid Solution: Amt./30 Gal.	Acid Solution: Temp. Deg. F.	Alkaline Solution: Wt./30 Gal.	Alkaline Solution: Temp. Deg. F.	Time In Use Weeks	Visible Soil[1]	Color of Deposit	Sterilizer Used
Acid cleaner A plus alkaline cleaner A	4 pt.	120	1 lb.	120	5	+++	Brown	Hot water
Acid cleaner A plus alkaline cleaner A	4 pt.	160	1 lb.	160	4	+++	Brown	Hot water
Acid cleaner B plus alkaline cleaner A	2 pt.	160	1 lb.	160	4	++	Brown	Hot water
Acid cleaner A plus alkaline cleaner B	1 pt.	170	2 lb.	170	2	+++	Brown	Chlorine
Acid cleaner A plus alkaline B plus chlorine solution	1 pt.	170	2 lb.	170	2	.....	.....	Chlorine
Acid cleaner A plus alkaline cleaner C	2 pt.	160	10 oz.	120	1	+++	White	Hot water
Acid cleaner A plus alkaline cleaner C	3 pt.	160	10 oz.	120	4	.....	.....	Hot water
Acid cleaner A plus alkaline cleaner D	3 pt.	160	2 lb.	120	2	.....	.....	Hot water
Acid cleaner A plus alkaline cleaner E	3 pt.	120+	30 oz.	120	6	.....	.....	Chlorine
Acid cleaner A plus alkaline cleaner E	3 pt.	160	30 oz.	160	2	+	L. Brown	Quaternary
Acid cleaner C plus alkaline cleaner F	1 pt.	150	10 oz.	150	3	.....	.....	Chlorine
Acid cleaner A plus alkaline cleaner E	10 oz.	160	10 oz.	160	5	+	L. Brown	Chlorine
Acid cleaner A plus alkaline cleaner E	10 oz.	160	10 oz.	160	2	+	L. Brown	Quaternary
Acid cleaner A plus alkaline cleaner G	10 oz	160	1 lb.	160	3	+	L. Brown	Chlorine
Acid cleaner A plus alkaline cleaner H	10 oz.	165	1 lb.	165	1	++	Brown	Iodine
Acid cleaner D plus alkaline cleaner G	1 lb.	165	1 lb.	165	2	+++	Brown	Iodine
Acid cleaner D plus alkaline cleaner G	2 lb.	165	2 lb.	165	3	.....	.....	Iodine
Acid cleaner sanitizer	1 lb.	120	.....	...	1 day	++++	White	Quaternary

[1] Number of plus marks indicates quantity of soil. Acid Cleaners: A, B, C, common phosphoric acid types; D, crystalline acid salt. Alkaline Cleaners:

to completely cover the stopper was placed over it. This assembly was forced through the tube with a wooden rod. The hole in the stopper makes it more compressible, also provides a socket for the push rod.

When swab was forced from end of tube it was removed from the rod and examined. If colored soil was observed, this was noted and its general composition determined if possible. Tests of swabs were made (whether or not soil was observed) to determine if proteins were present. Either the biuret or dye (picric acid) adsorption test was used.

Experimental Results

Findings of the study are presented in Tables I and II. Cleaner compounds are not listed by name, but the general class of materials to which each belongs is given in the footnotes. In general, manufacturers' directions as to the concentrations and temperatures to use were followed, except where these proved to be inadequate.

As expected, raw milk lines proved easiest to clean.

Cleaning agent temperatures were kept at approximately 120 deg. F., since in the absence of "burn-on" hotter solutions should not be necessary. Also, this temperature should make the methods readily applicable to in-place cleaning of milking-machine lines on farms where steam or very hot water may not be available.

Alkaline cleaners A and B, which were typical high-grade hand-washing compounds containing 10 percent or more of wetting agents, proved to be unsatisfactory by themselves because of the progressive deposition of a dark brown gelatinous film in the pipe. This film was analyzed and appeared to consist largely of sulphonated hydrocarbons in combination with milk and water residues. Acid and alkaline cleaner-sanitizers tested were also unsatisfactory because of film deposits. A typical swab illustrating this condition is shown.

Excellent results were obtained by combining A and B with chlorine solution at the rate of 4 oz. of 15 percent chlorine material (or equivalent) to 30 gal. cleaning solution. Equally good results were noted with washing powders containing no wetting agents or containing them only in small amounts.

Acid and alkaline combinations also gave clean lines. It may be necessary to use these occasionally where very hard waters are encountered.

No correlation was found between film deposition and bacterial counts. In fact, some of the lowest counts were obtained in instances where heavy films were readily visible. These films were removed each week, and it is possible that high counts might have been obtained had they been allowed to accumulate over longer periods. In any event, bacterial count cannot be recommended as the sole measure of the cleanliness of CIP lines.

Only two positive coli counts were obtained, and it is probable that these were the result of contamination during swabbing.

Hot Milk Lines

Milk in holder tube of HTST unit was maintained at 162 deg. F. during the daily 3-hr. run. This tube was cleaned in conjunction with the unit. Cleaning solution temperatures were varied between 120 and 170 deg. F. In general, temperatures of 160 or above proved most satisfactory. Lower temperatures required higher concentrations of cleaning materials to produce equivalent results.

Cleaners containing high percentages of wetting agents produced heavy brown films in the lines after one week's use. These films did not appear when chlorine was mixed with the alkaline solution. When these cleaners were replaced with mixtures containing little or no wetting agent, or with bottle-washing caustic in adequate amount, no films appeared.

As stated, cleaner concentrations conformed to manufacturers' recommendations, except where these were found inadequate for good results. Under some conditions it was necessary to increase the acid from one to three pints per 30 gal. of solution.

When HTST unit was used for pasteurization of chocolate milk, the cleaning problem was much more difficult. Doubling concentrations of both acid and alkali needed for ordinary cleaning effectively removed the soil deposited by this product.

Again, there was little or no correlation between film deposition in the lines and the bacterial counts. It was evident that this film was rendered practically sterile by the heat or chemicals employed for sanitizing.

Cold Pasteurized Lines

Also cleaned in conjunction with the HTST unit were cold pasteurized milk lines. Soil deposition was slight due largely to temperature of milk being transported. Cleaning treatment was undoubtedly much more drastic than necessary for good results. How-

Bacterial Data

Hot Pasteurized Milk Lines					Cold Pasteurized Milk Lines						
No. of Samples	E. Coli Count	No. Sterile Samples	No. Above Standard	Percent Above Standard	No. of Samples	E. Coli Count	No. Sterile Samples	No. Above Standard	Percent Above Standard	Visible Soil[1]	Color of Deposit
40	0	7	15	37	40	0	6	20	50	+	L. Brown
32	0	0	3	9	32	0	0	16	50	+	L. Brown
32	0	2	11	34	32	0	7	19	59	+	Yellow
16	0	5	6	37	16	0	13	0	0	++	Brown
16	0	14	0	0	16	0	16	0	0		
8	0	6	0	0	8	0	5	0	0		
32	0	19	2	6	32	0	18	1	3		
16	0	7	1	6	16	0	10	2	12		
32	0	20	0	0	32	0	22	0	0		
16	0	2	4	25	16	0	7	0	0		
24	0	8	12	50	24	0	16	1	3		
40	0	11	10	25	40	0	12	5	12		
16	0	5	1	6	16	0	2	1	6		
16	0	11	0	0	16	0	7	2	12		
8	0	3	1	12	8	0	4	0	0	+	Brown
16	0	10	0	0	16	0	7	0	0	+	Brown
24	0	18	0	0	24	0	10	2	6		

A, B, H contained 10% or more wetting agent; D, E, F contained 5 % or less wetting agent; C was without such agent; G was bottle-wash caustic.

ever, where this circulatory arrangement is possible, considerable savings in time, labor, and cleaning materials may be obtained.

Cleaning materials that produced satisfactory results closely paralleled those found best for the hot lines, as might be expected.

HTST Pasteurizer

Observations were made as to effectiveness of various combinations for in-place cleaning of HTST unit, but no bacterial counts were made on the plates. The machine was dismantled weekly for inspection, and also cleaning if this was found necessary. Where materials of questionable effectiveness were used, as in the case of the acid cleaner-sanitizer, the pasteurizer was opened after the first day's run. Some materials were used for one day only, and were so ineffective that no note was made of them.

Because protrusions on each plate are in contact with the plate adjacent, cleaner solutions reach these areas with difficulty and flow rates are much reduced. Good plate gaskets are a necessity if these units are to be cleaned in place.

Based on visual inspection, the following cleaning procedures were found to be most satisfactory under our conditions:

1. Release pressure on plates slightly, but not so much that they leak.

2. Flush until water flows clear.

3. Circulate acid cleaner, according to manufacturers' directions, for 30 min. at 160 deg. F.+. Adjust acid concentration if necessary.

4. Flush acid from system.

5. Circulate alkaline cleaner solution, made according to manufacturers' recommendations, at 160 deg. F.+ for 30 min. Four ounces of 15 percent chlorine solution, or equivalent, may be added to the above for best results. Adjust alkaline concentration if necessary.

6. Flush system and drain.

7. Smitize before use.

It is to be noted that lines must run *full* during all cleaning operations.

Most plate equipment has not been designed specifically for in-place cleaning, therefore some areas cannot be cleansed well because solutions reaching them are not moving at velocities sufficiently high to assure good cleaning. Manufacturers who give consideration to the advantages of in-place cleaning and who design the future units for it will have real sales advantages and will be rendering a service to the industry.

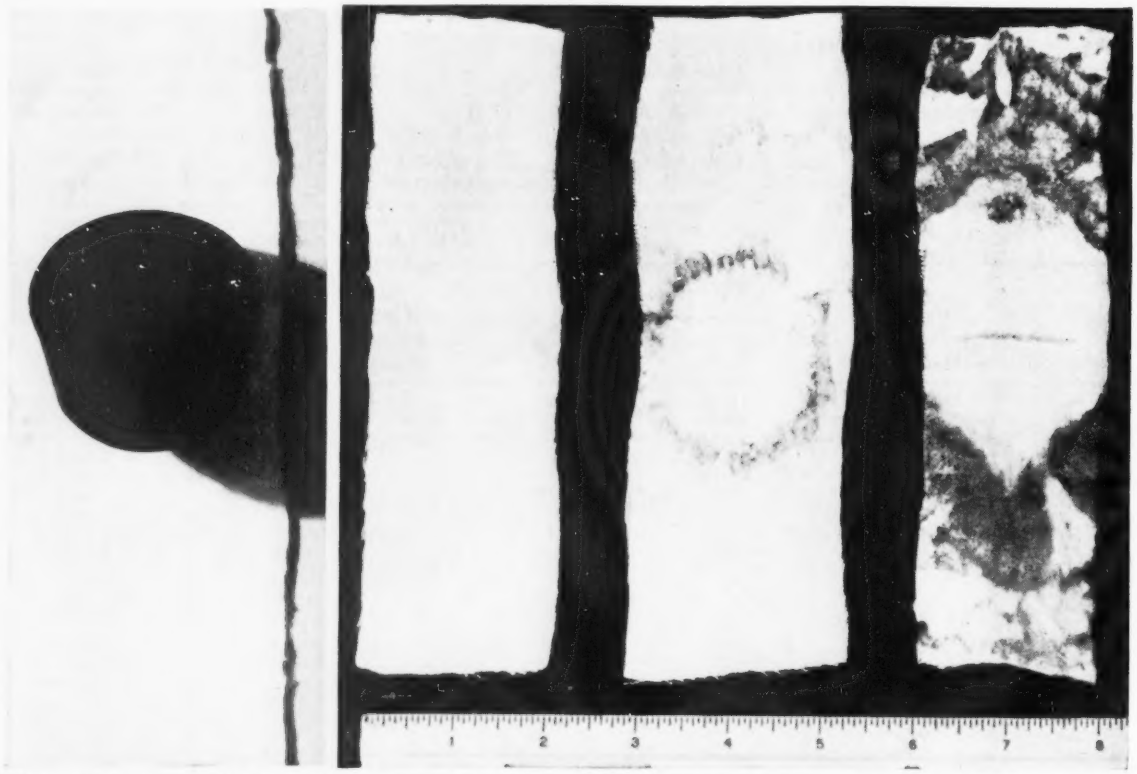
Pumps and impellers initially used for this study gave flows of approximately 1, 2.5, 5, and 8.5 ft./sec.

Visual observation showed that with the cleaner used, 1 ft./sec. was inadequate, but no differences could be seen at rates of 2.5 ft./sec. and over.

After this initial trial, only the three higher velocities were used, and no definite differences in cleaning efficiency could be credited to them. It is highly probable that differences would appear with heavier soils and that higher rates of flow would be more effective. With increases in rate of flow, pressures in the system increase markedly—and quickly become a limiting factor because of the danger of blowing gaskets.

Cleaning of stainless steel lines handling milk at high temperatures was not originally a part of the plan of this study. Because the question was raised by a plant operator, an experiment was carried out to determine whether or not these lines could be satisfactorily cleaned without dismantling. Milk was circulated through the system for several hours on successive days at 200-210 deg. F.

Cleaning procedure that appeared most satisfactory was identical with that recommended for cleaning the HTST pasteurizer. Bottle-washing caustic with chlorine added seemed more effective after the acid treatment than the common hand- or can-washing compounds. Lines remained in excellent condition under this system.



MILK LINES were swabbed weekly. Left: Special stopper and cloth patch used. Right (l. to r.): Swab from clean line; one sanitized with quaternary; and one washed with powder having high wetting agent content.

VARIOUS brands of new dietetic beverages and (front row) the special ingredients involved in their manufacture. Note specially attractive bottling and labeling employed—making for top consumer appeal.

Before Acting Check *Your* State Laws—

- ★ *All Synthetic Sweeteners are Prohibited in*—Delaware, Georgia, Iowa, Kansas, Kentucky, Maryland, Mississippi, North Carolina, Ohio, Pennsylvania, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, Washington.
- ★ *Saccharin Is Specifically Banned in*—Arizona, Colorado, Louisiana, Maine, Minnesota, North Dakota, Oklahoma, Oregon, Rhode Island, Tennessee.
- ★ *Rulings Approximate FD&C Act of 1938 in*—Alabama Arkansas, California, Indiana, Missouri, Nevada, New Mexico, Wyoming, District of Columbia.
- ★ *Synthetics Are Permitted in Dietetic Beverages When Properly Labeled in*—Connecticut, Illinois, Michigan, Montana, Nebraska, New Hampshire, New York, Wisconsin.
- ★ *Synthetics Are Allowed But Consumer Must Have Doctor's Prescription in*—Florida, Massachusetts.
- ★ *There are no Specific Regulations in*—Idaho, New Jersey, West Virginia.

Making Good Sugar-Free Drinks

Difficulties are posed when conventional sweeteners are replaced by synthetics. But bodying and anti-foaming agents help in alleviating the major shortcomings

ROBERT M. SANDRI
Chemist, Brookdale Beverage Co., Bloomfield, N. J.

Numerous technical problems are encountered in the formulation of the popular new sugarless or, as some bottlers choose to call them, dietary or dietetic soft drinks. As will be shown here, however, these hurdles are not insurmountable.

It may be noted first that beverages made according to the usual formula for sugar-containing drinks, but in which Sucaryl Abbott (trade name for calcium cyclamate) is substituted for the sugar, lack the body or "mouth-feel" of the former.

For, in addition to imparting sweetness to a drink, sugar is the most important factor involved in production of body. In making 100 gal. of regular 32 Bé syrup, 635 lb. of sugar is required. When the sugar is replaced with Sucaryl, only 9-12 lb. of the latter is required to produce comparable sweetness. Loss of body resulting from this change can readily be understood.

Bodying Agents Help

To overcome this condition, a number of bodying agents are available which are satisfactory from a food standpoint. But each has to be experimentally adapted to the particular beverage being manufactured.

The following products, when used in the range from 0.1 to 1.5 percent by weight, have been found to yield satisfactory consistencies, also to be compatible with the other ingredients in the drink.

SeaKem, Type 5 (Seaplant Chemical Corp.)

No. 444 Exchange Pectin, N.F. (Sunkist Growers).

CMC, 70S High and other grades. (Hercules Powder Co.)

Sorbitol (Atlas Powder Co.)

The latter requires no special techniques in its use.

When employing one of the first three, however, care and special methods of adding must be exercised in preparation of the bottling syrup. Hot water (170-200 deg. F.) and vigorous agitation aid greatly in their incorporation. Bodying material must be added slowly, with a sifting action, to the vortex of the water (if such is formed by the agitator). Then be sure no lumps or undissolved particles remain before other ingredients of the syrup are put in.

Foaming a Problem

Most makers of sugar-free beverages have been troubled with foaming during bottling and, also, with rapid loss of carbonation within a short time after the bottle had been opened.

Here at Brookdale, we have been making and marketing Diet-Treet Pale Dry Ginger Ale and Diet-Treet Real Fruit Orange for almost a year. During the development period foaming and loss of CO_2 were pesky problems, but later our subsidiary, Brookdale Laboratories, developed a product called Carbo-Lok that has practically eliminated these difficulties.

From experimental and production data and observations, we have concluded that foaming and rapid loss of CO_2 are directly related to surface tension and certain other

(*Turn to page 196*)

SAMPLE FORMULA (Sugarless True Fruit Raspberry Syrup)

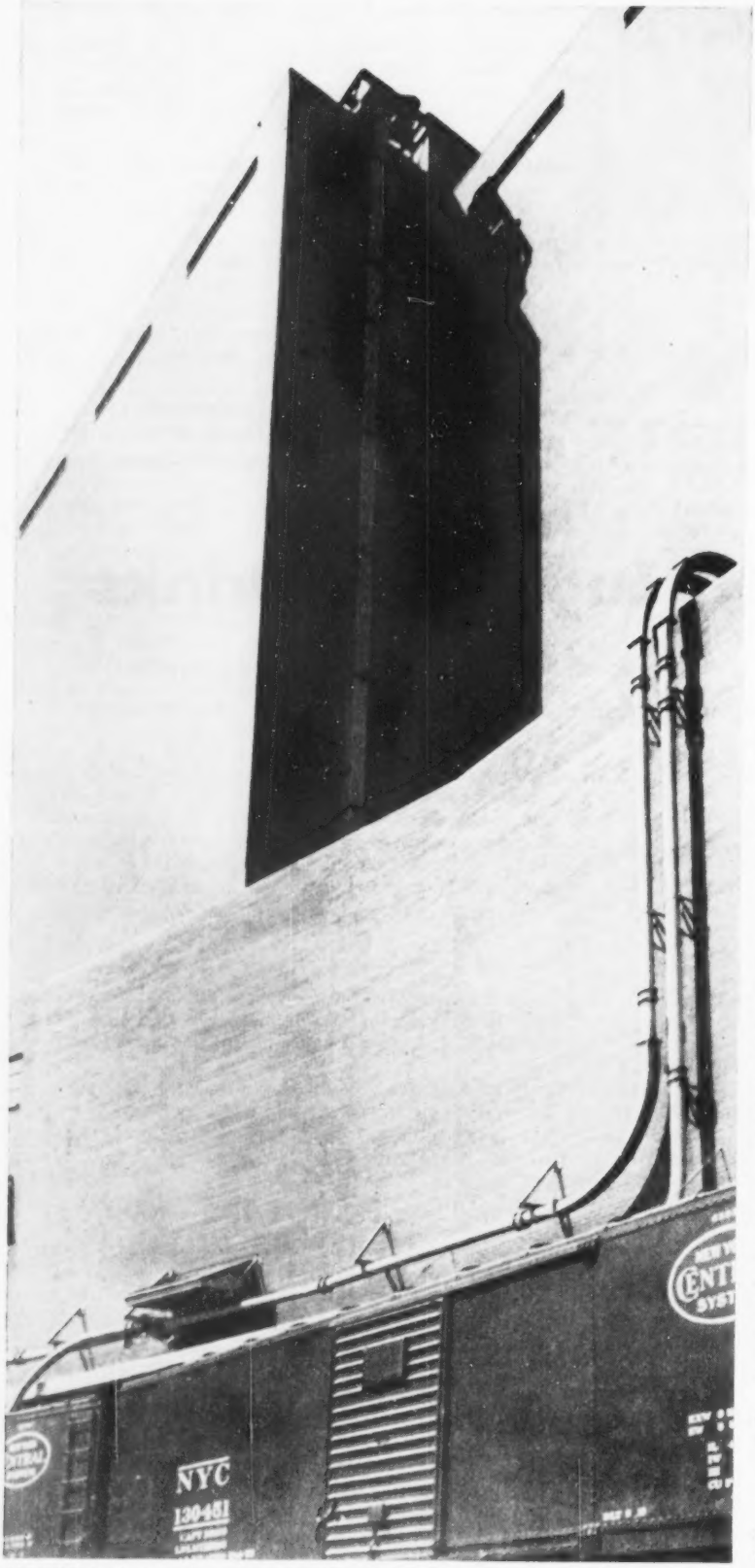
Ingredients	Quantity	Method of Addition
Water (180–190 F.)	40 gal.	
Sodium benzoate	½ lb.	To water
Pectin, N.F. No. 444	6 lb.	Add slowly with vigorous agitation
Calcium Sucaryl	12 lb.	To above with agitation
Cold water	Bring to 100 gal.	
True Fruit rasberry flavor	3¾ gal.	With agitation
Citric acid sol. (50 percent)	150 fl. oz.	With agitation
Color	To suit	With agitation
Carbo-Lok	4 oz.	Sift in with agitation

Pushbutton System

Cuts Handling

Air-operated conveyors move brewers grain from car to storage, from storage to processing. Automatic scales check and control weights. Dust collector makes plant and neighborhood cleaner

ARTHUR V. GEMMILL
Senior Associate Editor, "Food Engineering"



MODERN 11-story brewhouse of Duquesne Brewing Co., Pittsburgh, where vacuum is employed to unload grain from box cars. Product moves through pipelines (shown) to top floor, then is conveyed to 20,000-bu. storage silos.

Automation was the order of the day when Duquesne Brewing Co., Pittsburgh, designed and built its new, ultra-modern 2,000,000-bbl. brewhouse.

And as a result, manual handling of malt and adjuncts has been reduced to a minimum in the present operation.

To accomplish this, a bulk handling system was installed that automatically moves products from cars to storage silos, and from storage to processing. Virtually all operations from the 4th to 11th floors are pushbutton controlled.

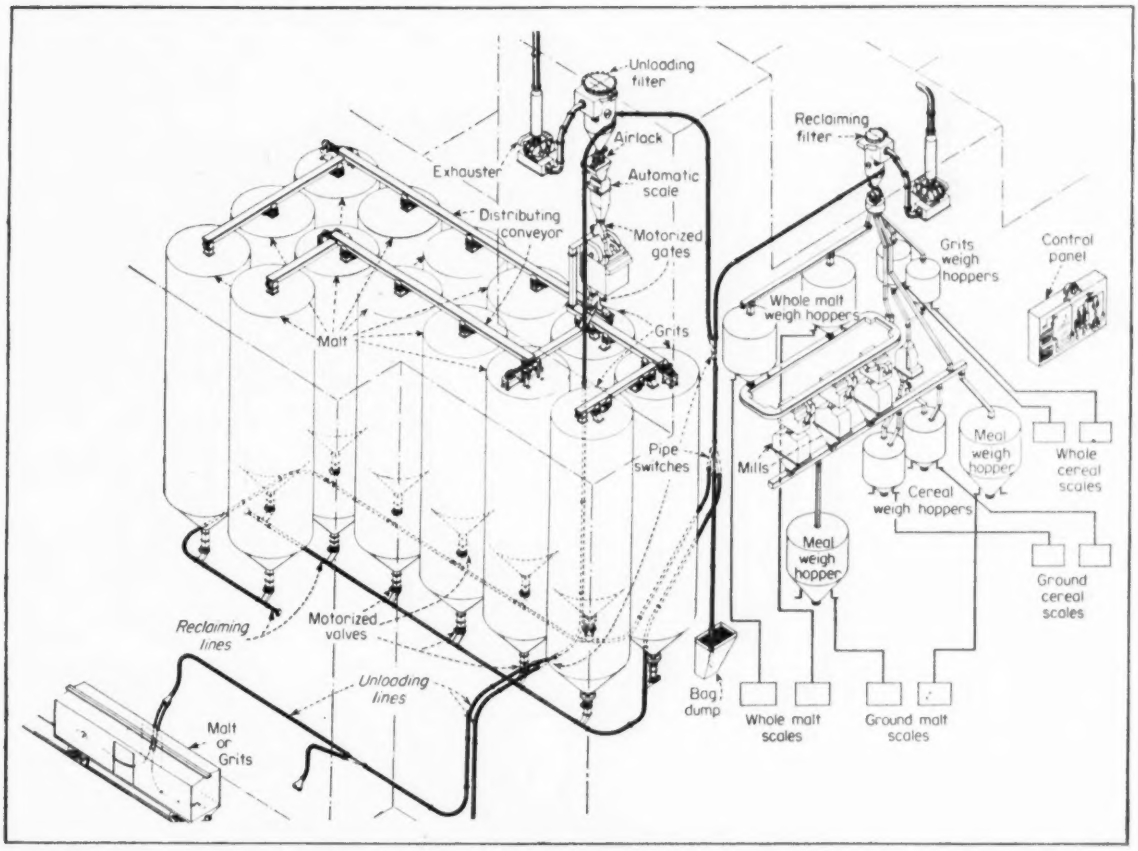
The system is operated from a single control panel located on the 5th floor. Here, interlocked pushbuttons minimize possible errors. One operator does the job. He pushes a series of buttons to unload cars, or reclaim products from storage silos and deliver weighed amounts to processing. Lights on the panel indicate lines of flow.

The handling system is comprised of the following separate, yet carefully integrated, units:

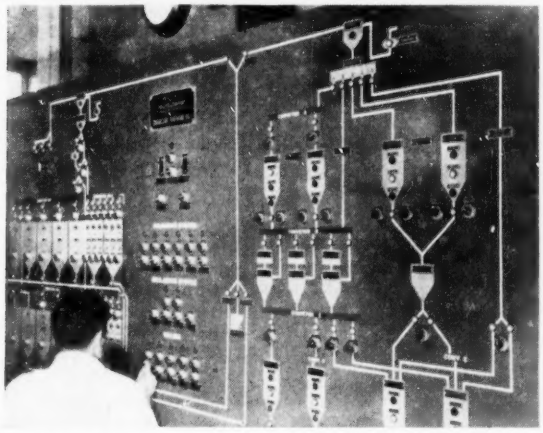
1. Two giant pneumatic conveyors.
2. Two weighing systems.
3. Auxiliary dust collecting equipment interlocked with the various units to insure elimination of dust within and without the plant.

Grains arrive at the brewery in box cars and are unloaded at any of three

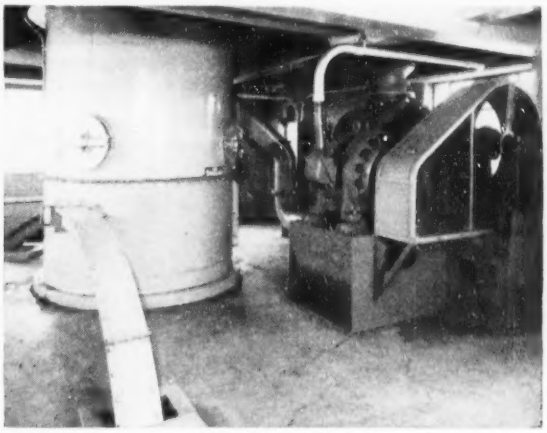
"How" and "Why" of Bulk System



VACUUM and screw conveyors, and automatic scales are carefully integrated to provide fool-proof, pushbutton movement of grains at speeds up to 2,000 bu. per hr. of malt, or 25 tons per hr. of grits.



CONTROL PANEL on 5th floor is heart of handling system. From here, operator directs flow of products from cars to storage, and to processing.



GRAIN is separated from air stream in receiving filter (left) on top floor of brewhouse. Exhauster (right) provides vacuum for conveyor.

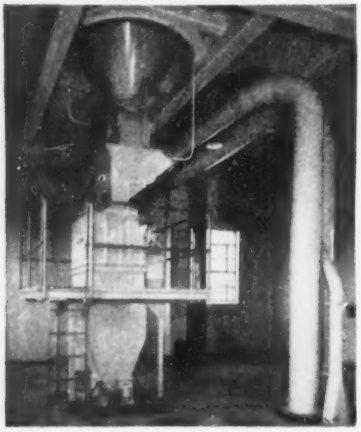
stations by a vacuum-type Fuller Airveyor. Capacity of this unit is 2,000 bu. of malt, or 25 tons of adjuncts per hour.

Two flexible metal hoses equipped with pickup nozzles connect with stationary standpipes that lead to a receiving filter on the 11th floor.

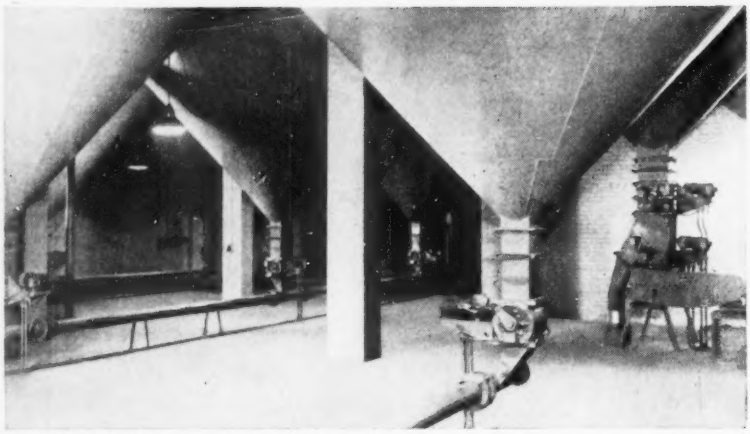
This unit removes all solids from the air stream and discharges them through a rotary airlock into a Richardson automatic receiving scale. By weighing the incoming grains in batches and recording these weights, the scale provides a continuous check on weights of car contents.

Inside the receiving filter are a number of compartments, each of which is out of service every 2 min. for cleaning of the cloth filter bags. Motors attached to each compartment shake the bags vigorously for approximately 15 sec. Cam-operated valves cut compartments in and out.

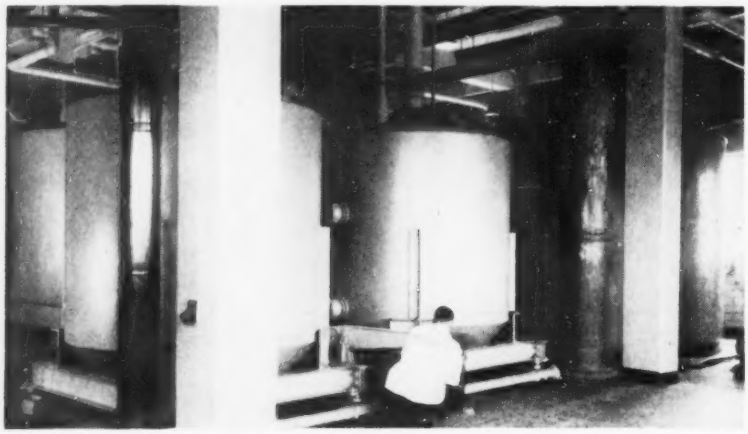
Checks and Controls Prevent Errors



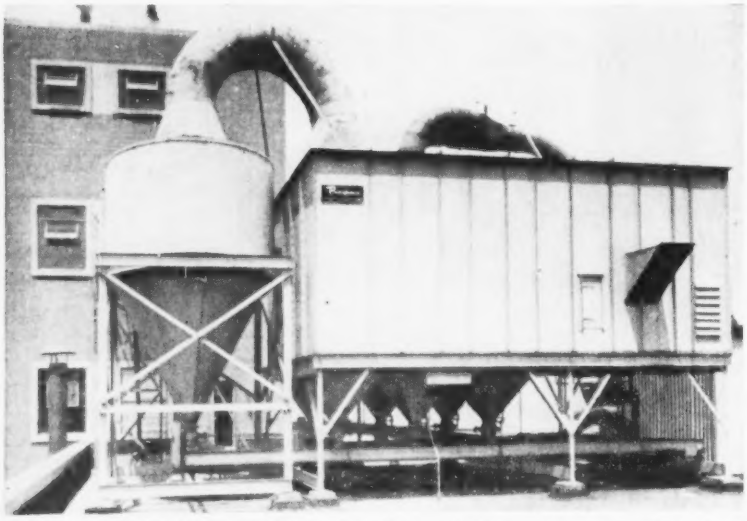
WEIGHT of incoming grain is recorded by Richardson scale. Pipes (right) lead to dust collector on roof.



MOTORIZED discharge valves on bottom of silos are operated by pushbuttons on 5th floor panel. Valves allow grains to flow into pipelines of 2nd Airveyor that delivers to reclaiming filter on 8th floor.



WHOLE-GRAIN hoppers, mounted on scales, receive grain from reclaiming filter. When desired weight is delivered, microswitch shuts off conveyor.



DUST COLLECTOR, mounted on brewhouse roof, is connected with every source of dust in building. One side serves units handling unused grains; other side dried spent grain system. Worm on bottom discharges dust to cars.

Necessary vacuum to lift materials from car to filter is produced by a 100-hp. positive-pressure exhauster.

From the scale, malt passes over a cleaner, then is conveyed mechanically to one of the storage silos. There are 14 of these 20,000-bu., 4-story steel bins—11 for malt, the others for grits and rice. Adjuncts bypass the cleaner and are spouted directly to conveyors.

Each bin is equipped with a remotely operated, motorized withdrawal valve, also high- and low-level indicators that energize lights and signals on the control panel. When a storage bin becomes full, the high-level indicator closes its contacts and causes a red light to appear on the panel. Also a warning horn will sound for approximately 10 sec., signaling that the bin is filled. When the alarm stops, the system will continue to run for about 10 sec., then shut down automatically.

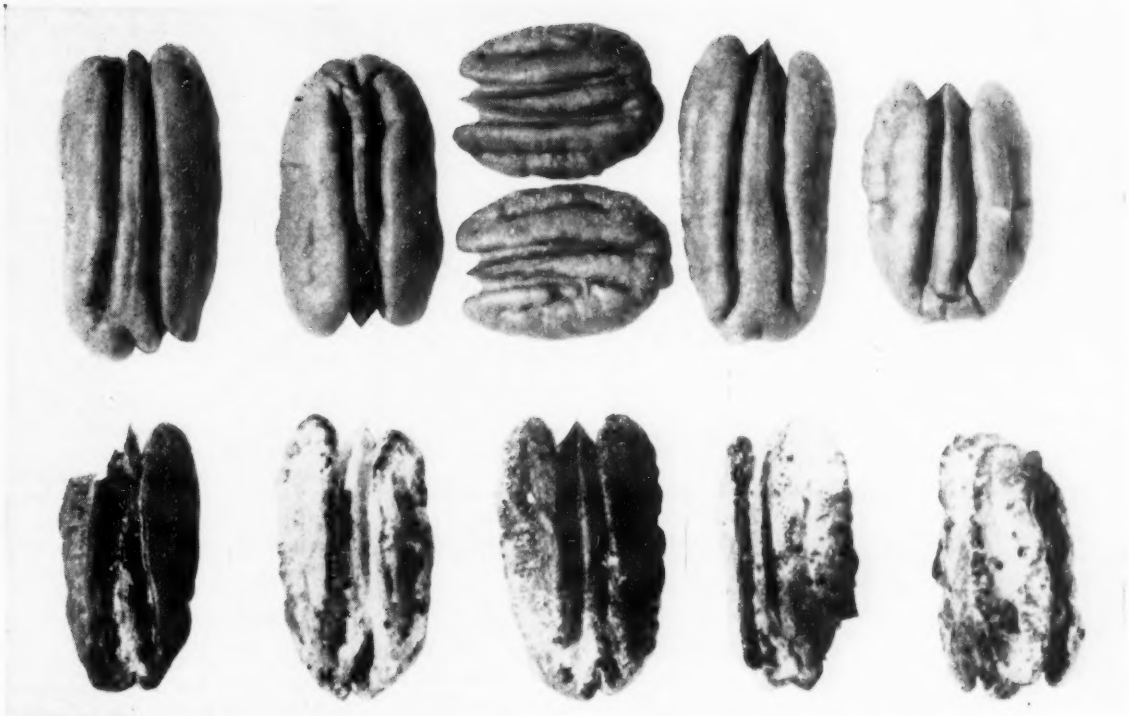
Materials to Processing

A second air conveying system driven by a 40-hp. motor withdraws materials from bottoms of silos on 4th floor and delivers them to a reclaiming filter on the 8th. This system has an hourly capacity of 750 bu. malt, 10 tons adjuncts.

The reclaiming filter is similar to the receiving one on the 11th floor. It discharges by means of a turnspout to any one of five destinations—two whole-malt weighing hoppers, two whole-cereal weighing hoppers, and directly to processing for use when products are received in bags.

When malt is required for mashing, the turnspout is arranged to divert the product to one of the whole-malt

(*Turn to page 197*)



EXCELLENT CONDITION is maintained in nuts by controlled, cool storage. Here, normal pecans are seen in top row, varieties being (left to right) Schley, Stuart, Desirable, Mahan, and Farley. Second row illustrates how pecans become moldy when poorly kept at excessively high relative humidities.

"Year 'Round on Pecans" *By Refrigerated Storage*

Keeping delicate-flavor nuts at 32 deg. F. and 68 percent RH retains quality, checks insect damage. Room should be free of odors, especially ammonia

J. G. WOODROOF and E. K. HEATON

Georgia Experiment Station, Experiment Ga.

Today, interest is high concerning refrigerated storage of both shelled and unshelled pecans.

Reason: Experiments over a period of several years have demonstrated that it pays very well—by making the nuts available for year 'round distribution and consumption.

And on the point of quality, such warehousing retards rancidity, prevents insect infestation, and serves to retain color and flavor.

Recommended for season-to-season storage are a temperature of 32 to 34 deg. F. and a relative humidity of about 68 percent. For short-time storage, the nuts can be held at 48 deg. F.

But proper refrigerated storage is not enough. Pecans must also be properly packaged, and care must be taken to prevent absorption of outside flavors and odors.

Answers to significant pecan-storage problems are presented here, together with data on warehousing temperatures and humidities.

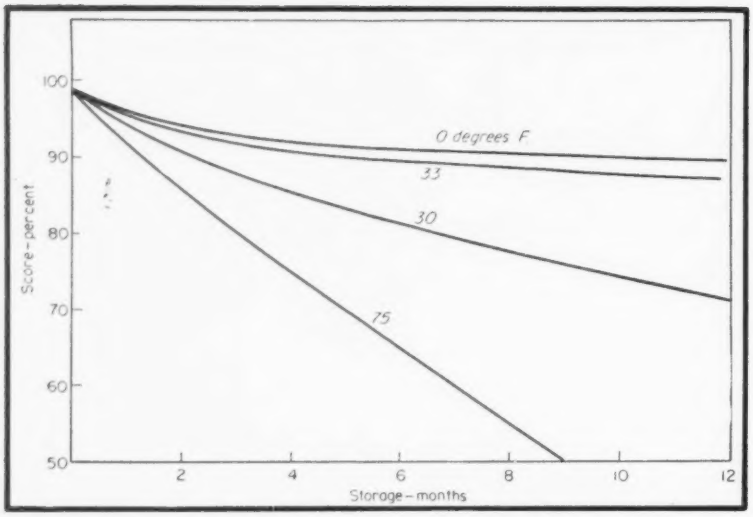
During the last decade, yield of pecans has ranged from a 38,687-ton low in 1942 to an 88,834-ton peak in 1948. The past 15-yr. average was 59,759 tons. This is only slightly smaller than the walnut crop, almost twice that of almonds, and ten times that of filberts.

Raw or roasted pecans are one of the most delicately flavored nuts. The peak of the flavor is attained—through drying, aging, and curing—within a few weeks after they mature. But once optimum flavor is reached, it is difficult to prevent staling, rancidity, mustiness, or absorption of outside flavors.

Very High Oil Content

Maximum oil content is 76 percent in Schley and other high-quality varieties. The large amount and character of the oil tend to shorten the shelf-life of shelled or unshelled pecans.

They are refrigerated to maintain natural flavor and color, extend marketing season, and stabilize prices. While almost half of the crop is stored or marketed unshelled, great strides have been recently made in mechani-



EATING QUALITY remained high when shelled nuts (Stuart variety) were kept at lower temperatures, but fell off (note graph lines) at higher temperatures. Nuts were unacceptable (under 50 score) after 9 months at 75 deg. F. Ratings were based on color, texture, aroma, and flavor.

cally shelling, drying, and grading them. A recent increase in formulas for the use of pecans in baked goods, ice cream, and candy—as well as for roasting—has stimulated year 'round demand.

Refrigerated storage is, therefore, the only economical, large-scale method of preventing pecans from becoming stale, rancid, or infested. Fumigation and packaging may protect the nuts from insects, and antioxidants may curb rancidity, but refrigeration offers the best over-all protection.

To store pecans properly, it is necessary to: (1) Employ temperatures sufficiently low to preserve freshness, and (2) use recommended humidities to maintain a desired moisture content.

Effect of varying temperatures and humidities on chemical changes and organoleptic scores of shelled and unshelled pecans after 12 months' storage are shown in Table I.

The moisture content at which shelled pecans equalized, when stored at four different temperatures and relative humidities, is shown in Table II.

And the moisture content at which unshelled Stuart pecans equalized, when stored at four temperatures and three relative humidities, is shown in Table III.

Taste-panel judges found that pecans stored 12 months at 0 deg. F. remained "green" (uncured), otherwise they were almost perfect. Those kept at 33 deg. F. became slightly darker and had a slightly foreign flavor. Shelled and unshelled pecans were scored 84 and 86 percent, respectively.

At 50 deg. F., shelled pecans darkened and lost quality much more rapidly than the unshelled nuts, which were of good quality. Shelled nuts were only fair—the flavor was acrid or rancid and the color dark brown.

Shelled pecans rapidly lost freshness at 70 to 80 deg. F. They turned brown, developed the strong odor and flavor of old pecans, and soon became dry, brittle, and rancid. Within 6 months they were infested with insects (even in foil bags).

Organoleptic scores were far more significant in the detection of rancidity than were chemical tests of free fatty acids and peroxide numbers.

Under certain conditions, unshelled nuts held up about four times longer than pecan halves, and five or six times longer than medium or small pieces.

About Mold Development

No shelled pecans were moldy after 300 days at 32 deg. F. and 82 percent humidity. At a given humidity, moisture content of pecan meats appeared lower at 32 deg. F. than at higher temperatures. In respect to mold development and moisture content, unshelled nuts reacted similarly to shelled ones. Refrigeration also effectively arrested rancidity.

Pecans (halves and medium pieces) were stored over 300 days at 32, 50, 68, and 86 deg. F. Humidities employed were 65, 72-73, and 80-82 percent. The moisture content of halves was somewhat higher than that of medium pieces. At any of the three humidities, the moisture content of the nuts varied with the temperature.

PECANS should be stored in rooms free from ammonia leaks. Top row shows nuts, tissues, and shells badly blackened by the gas—as compared with normal nuts (second row) held under proper, ammonia-free conditions.

Moisture Equilibrium

Moisture content of unshelled pecans was somewhat higher than that of shelled nuts, and it varied among varieties. Equilibrium moisture is higher in shells than in meats. Moisture in shells was 12 to 21 percent—about four times that of meats. Undoubtedly, some of the moisture in the shells transferred to the meats.

E.R.H. (Equilibrium Relative Humidity) values are not absolutely accurate, but they are a valuable index for planning a storage room for pecans. Nuts with a 3.6-percent moisture content have an E.R.H. value of 60 percent. Those with a moisture content of 4.0, 4.6, and 5.2 have E.R.H. values of 65, 70, and 75 percent, respectively.

A 1-percent change in the moisture content of pecan meats was equivalent to about a 10-percent change in E.R.H. value. The E.R.H. value for

shelled pecans was more significant than for unshelled nuts. There was a considerable difference among unshelled nuts due to variety, shell thickness, and maturity. Results obtained on Stuart pecans are reported in Table III. This well-filled variety is the most common, with medium thick shells.

The moisture content of shelled pecans was found in equilibrium with a 35-73 percent humidity. According to findings, a 3.5-percent moisture content would be maintained when pecans are stored at about 58 percent humidity. Higher or lower humidities equalize the moisture content at correspondingly higher or lower figures.

Data in Table I also show that shelled pecans stored at 50 or 68 deg. F. and an 82 percent humidity had a moisture content over 8 percent. When kept at 82 deg. F. and the same humidity, the moisture content was only 6.2 percent. The slowness in picking up moisture at low temperatures—even at a high humidity—was one reason for absence of molds. None of the shelled or unshelled pecans stored at 32 deg. F. molded within 10 months, even at 80 percent humidity.

Ammonia Discoloration

Since ammonia is probably the most common refrigerant in commercial storage plants, there is always danger of it escaping into rooms, especially those cooled by direct expansion systems. Even traces of ammonia, not detectable by odor, darkened the seed coats of shelled pecans within a few weeks and unshelled pecans within a few months.

For several years, we have obtained reports from several commercial warehouses that experienced ammonia damage to pecans. The quantity of damaged nuts ranged from a few thousand to more than a million pounds.

A study was carried out on the nature of the damage, possible preventive measures, and methods of restoring the normal color. Unpackaged, shelled pecans darken within 2 hr. and are black in 3 days when ammonia is barely detectable by smell. Those exposed in the laboratory to strong concentrations of ammonia—such as would occur in the case of a leaky ammonia pipe—blacken within 10 min.

In this instance, ammonia discolored the seed coats and packing tissue of shells. Such damage may be identified by darkening of the center partition and packing tissue in the shell and a discoloration of the seed coat.

There was no change in the outward appearance of shells, nor in the color of meat under the seed coat. A faint off-flavor was detected immediately after exposure, but not after three days.

Separation of seed coats from the interior portion showed that these slightly-gas-damaged pecans had the color of very old nuts. Discolored, aged pecans were rancid, and weathered nuts were moldy.

Since ammonia made the meats unattractive and gas damage within a given lot varied considerably, it is advisable to grade detected damaged nuts as soon as possible. In this way, many good nuts can be recovered for candies or bakery products. Severely damaged ones can be used for oil or animal feed.

There was no detectable off-flavor or odor in thoroughly aerated ammonia-discolored pecans. And the meats were suitable for candies or cakes, in which the dark color is masked by other ingredients.

Packaging materials retarded blackening. Pecan meats stored in cans, glass jars, or aluminum foil bags were undamaged, while those in cellophane or Pliofilm bags were slightly damaged. However, those in kraft paper or open-mesh bags and chip-board boxes, discolored almost as badly as unpackaged nut meats.

Well-sealed, corrugated, 30-lb.-capacity kraft boxes effectively prevented access of ammonia, except along seams. But meats on the surface blacken first. Cloth tape or stapling was less effective in keeping out ammonia than heavy, gummed paper tape or glue. Box liners or cellophane,

(*Turn to page 141*)

Temperature, RH, and Moisture Effects on Nuts

TABLE I—EFFECT of Four Storage Temperatures and Two Humidities for One Year on Shelled and Unshelled Pecans

Storage		Chemical Analyses			Organoleptic Scores*					
Temperature (Deg. F.)	Relative Humidity (Percent)	Moisture (Percent)	Peroxide No. (mm. of O per kg. of Oil)	Free Fatty Acids (as % Oleic)	Appearance	Color	Aroma	Texture	Flavor	Total
Original		7.2	2.0	0.16	10	10	15	14	49	98
Shelled										
0	....	5.5	5.4	0.62	9	10	13	13	47	92
33	70	3.7	1.9	0.39	8	9	12	13	42	84
50	50–65	3.0	3.9	0.49	7	7	10	13	30	67
Room	50–65	2.8	3.0	1.06	4	3	5	11	6	29
Unshelled										
33	70	3.7	0.4	0.10	9	9	11	13	44	86
50	50–65	3.3	0.2	0.06	8	7	11	13	39	78
Room	50–65	2.6	1.1	0.28	6	5	6	12	7	36

*Maximum scores were 10 for appearance, 10 color, 15 aroma, 15 texture, and 50 flavor.

TABLE II—SHELLED-NUT MOISTURE Content: Percent at Which Pecans Equalized When Held at Different Temperatures and Humidities

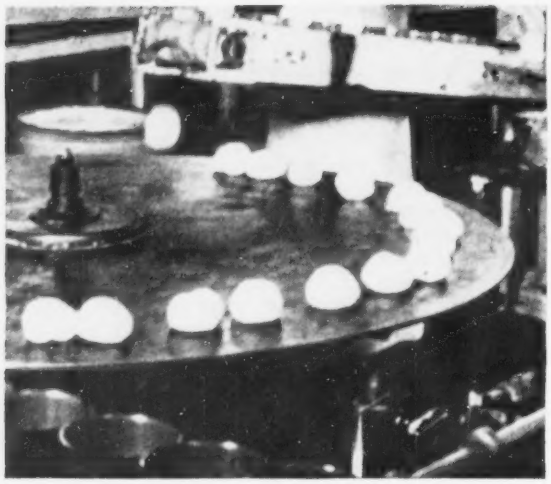
Temperature (Deg. F.)	Relative Humidity (Percent)	Moisture Content* (Percent)
32	41	2.34
32	51	3.29
32	65	3.94
32	72	4.94
50	39	2.34
50	50	3.10
50	65	4.03
50	72	5.27
68	35	2.15
68	52	2.82
68	65	4.39
68	73	4.74
86	41	2.34
86	50	2.91
86	67	3.94

*Initial moisture content was 3.41 percent.

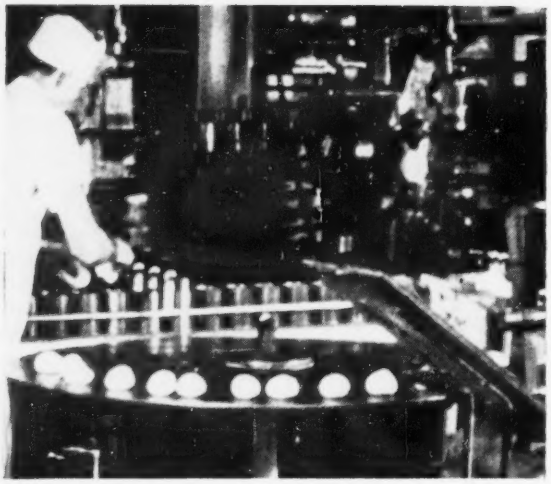
TABLE III—UNSHELLED-NUT MOISTURE Content: Percent at Which Stuart Variety Equalized When Held at Different Temperatures and Humidities

Temperature (Deg. F.)	Relative Humidity (Percent)	Moisture Content* (Percent)
32	65	4.04
32	72	4.73
32	80	6.65
50	65	4.79
50	72	6.34
50	80	7.36
68	65	5.80
68	72	7.21
68	80	7.29
86	65	3.54
86	72	5.29
86	80	5.89

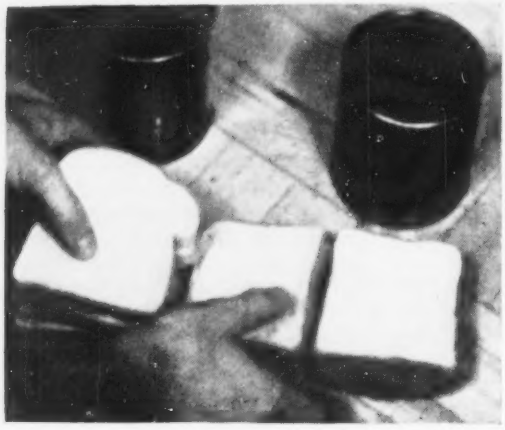
*Initial moisture content was 4.22 percent.



1 **DOUGH FROM MIXER** is scaled and formed into 5-oz. pieces by a regular bun machine.



2 **FROM GREASED** turntable, pieces are put in cans traveling along adjacent belt conveyor.



COOLED BAKED canned bread (right) closely resembles the familiar commercial loaf.

In-Can Baking Perfected

First sizable commercial bakery run of canned bread is "cinch." . . . Process seen widely adaptable to cakes and specialty items

D. N. LEAGUE
Director of Cost Control, Interstate Bakeries Corp., Kansas City, Mo.

There is no doubt about it—some challenging possibilities are open to the baker through the new technique of baking in cans.

But, won't high-priced new equipment be needed in canning bakery goods?

Also, won't considerable special training have to be given to employees?

And another query: Will the new process ultimately replace fresh-baked goods and their costly distribution?

These questions had long intrigued our organization, Interstate Bakery Corp. Accordingly, we closely followed the pioneer work in baked-goods canning at the Quartermaster Food & Container Institute in Chicago. Hence, when the process was perfected, we gladly contracted, in June 1951, to produce a trial half-million cans of bread for the armed forces.

While our contract took only one month to complete —with the production line fitted in on a very temporary basis—certain practical aspects were immediately clarified. For one thing, it was possible to quickly set up the line with readily available equipment. Second, very little special training was required to adapt our usual operators to efficient production.

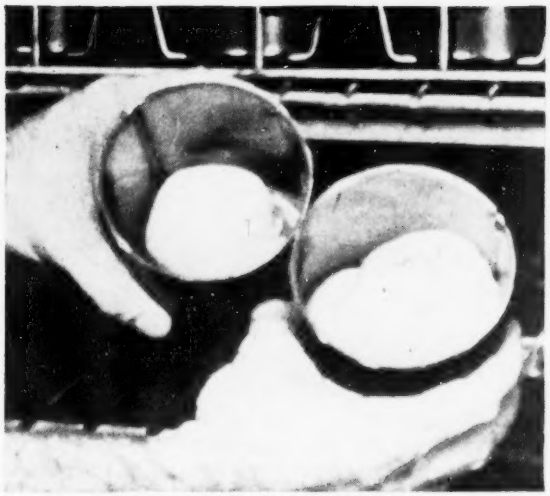
However, preliminary cost figures indicate the cost-per-can of our brief run to be approximately double that of a waxed-wrapped loaf. So it does appear doubtful that the economics of the process will ever alone justify its supplanting fresh bread for local distribution.

From the military standpoint, however, the project appears highly promising. Naturally, a soldier enjoys bread with his meals in the field as much as he did in civilian life, and reports have already indicated canned bread as a very desirable ration component.

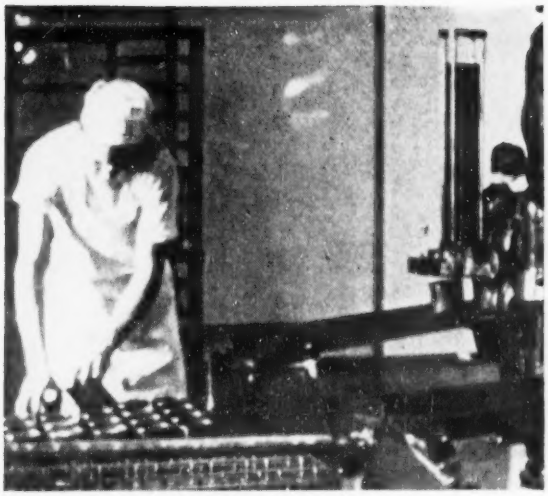
It is apparent that the canned item will also be of definite interest to civilian outposts not served by bakery facilities. And certainly it will be sought after by hunters, campers, and small-boat voyagers.

Another plus consideration is that the basic canned bread process also applies to many very interesting cake products. Military specifications have already been issued for a canned pound cake, and some highly promising items such as coffee cake, pecan roll, and holiday "stolen" have been made in the Food & Container Institute experimental bakery. Such items, of course, may have definite economic advantages in canned form.

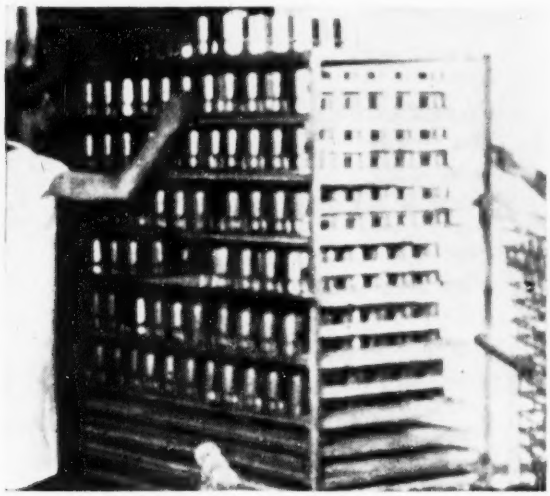
Adaptation of the baking process to the mechanical limitations of canning posed several problems. Baking in sealed cans created high internal pressures and subsequent



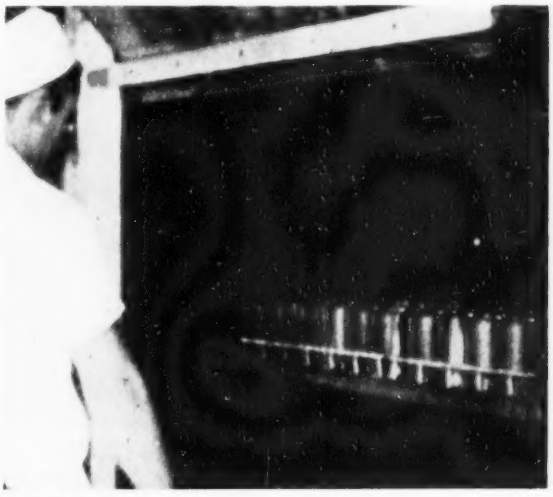
3 **BAKING PAN** is No. 2½ can of lacquered tinplate. Two dough pieces go in each can.



4 **CAN LIDS** are clinched by machine—loosely in order to allow gases and moisture vapor to escape.



5 **RACKBORNE CANS** are rolled into proofbox for 86 deg. F., 84 R.H. proofing.



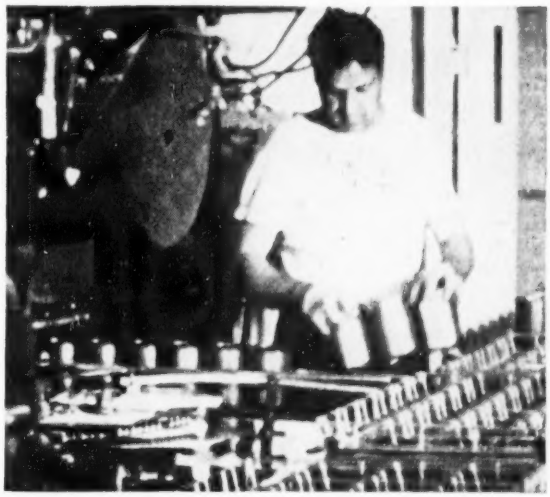
6 **BAKING** takes place in a regular tray oven—35 to 40 min. at 450 deg. F.

explosion—hence a loose clinching of the cover was devised to let gases escape over the dough during proofing and baking. Also, it was discovered that sealing should follow cooling of the bread, for hot sealing produced cans with a high-vacuum that made the container liable to collapse when jarred.

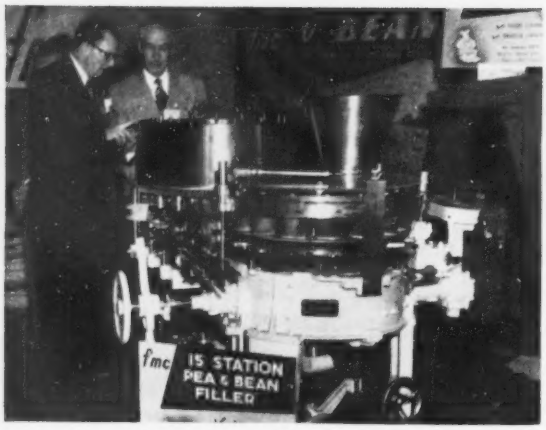
Rapid cooling after sealing was found necessary, since warm bread showed a tendency to develop an off-flavor, and crumb browning was accelerated in initially warm product during storage.

The can itself was found to be of major importance. A special enamel had to be developed that would not impart off-flavor, also a sealing compound that would resist the fat used in greasing the dough. Moreover, baking in the olive-drab can was found desirable, rather than in a bright can, since the darker surface aided heat adsorption.

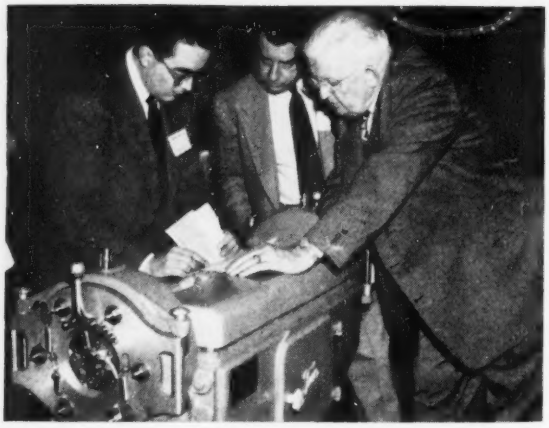
Conditions in mixing, fermenting, and baking were pinpointed. Best results were obtained with a rigidly controlled mixing temperature of 77 deg. F. and a fermentation temperature of 80 deg. F. And a uniform top and bottom heat in the oven was found essential—variations here, despite loose clinching, had caused some explosions during baking. *(Turn to Page 151)*



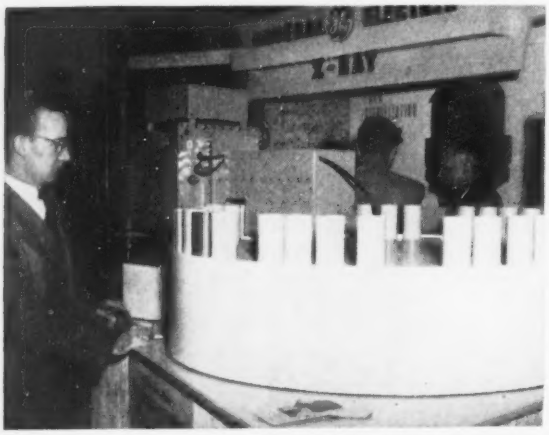
7 **CAN LIDS** are firmly clinched in a standard closer following baking and cooling.



PEAS, beans, corn accurately filled and brined at up to 350 No. 2 cans per min. on new 15-station filler. Features volumetric pre-measuring, minimum of parts, banked track to prevent spillage at high speeds.—Food Machinery & Chemical Corp., Hoopeston, Ill. (88A)



NEW cut-all attachment for Tuc corn cutters prevents successive ears from going through machine uncut or incorrectly. It virtually eliminates waste at this point. Can be applied to most units in field.—The United Co., Westminster, Md. (88B)

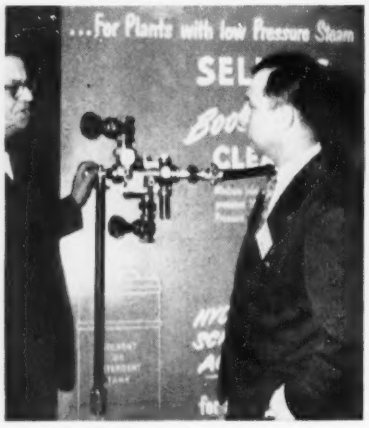


FILLED CANS are automatically inspected for over- and under-fill at speed of 900 per min. by X-ray unit that supplies electrical signal of sufficient amplitude to operate rejector. Accuracy of 1/64 in.—X-Ray Dept., General Electric Co., Milwaukee. (88C)

Canners View What's New At Annual Show

High-speed accurate filling and closing, better and more economical processing, feature machines displayed at Chicago

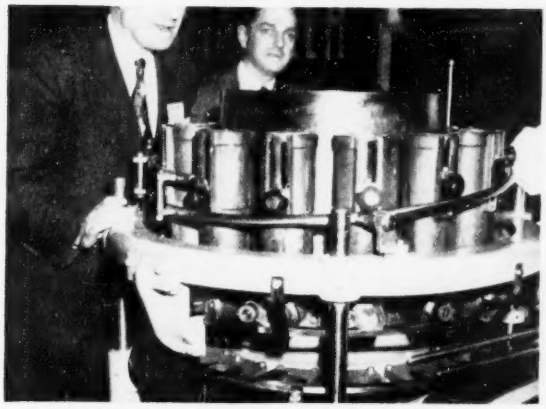
ROLL-OVER unit is said to grade out 95 percent of raw or scalded tomatoes without product damage. Applicable to other foods.—A. K. Robins & Co., Inc., Baltimore. (88D)



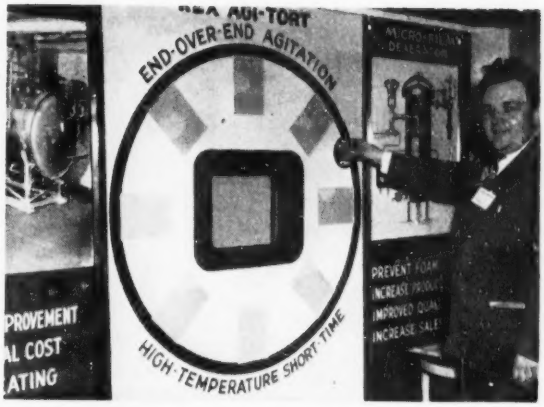
BOOSTER JET discharges hot water or hot detergent solution at 100 psi. pressure (with 5 psi. steam) or at 200 psi. pressure (25 psi. steam)—Sellers Corp., Philadelphia. (88E)

TWO-WAY communication is provided by this base station transmitter and receiver displayed by Communications & Electronics Div. of Motorola Inc., Chicago. (88F)

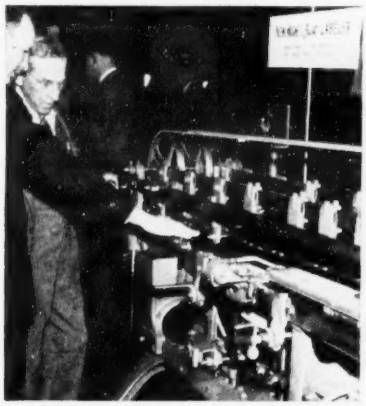
Filling, Sterilizing, Identifying Units



HIGH-SPEED FILLERS, featuring electrical "no-can, no-fill" devices and easier, quicker adjustments for containers of varying heights, were displayed by The Pfaudler Co., Rochester, N. Y. (89A)

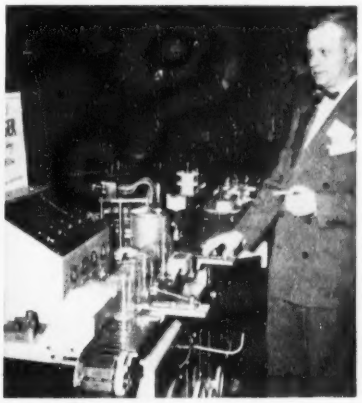


MOVEMENT of headspace in can of product as it rotates during retorting in Rex Agi-Tort unit was demonstrated by eight lighted panels in wheel at booth of Chain Belt Co., Milwaukee. (89B)

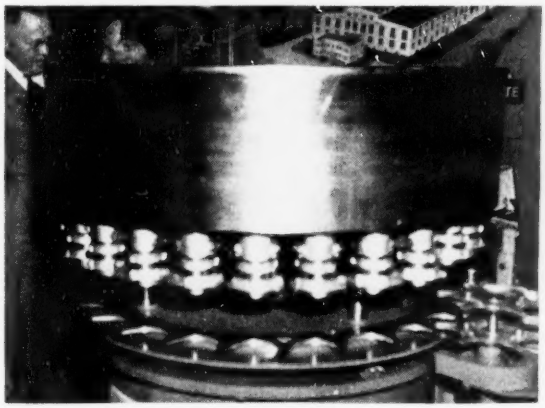


SHUTDOWNS for replenishment of labels have been eliminated in new non-stop labeler that features dual label feed.—Burt Machine Co., Baltimore. (89C)

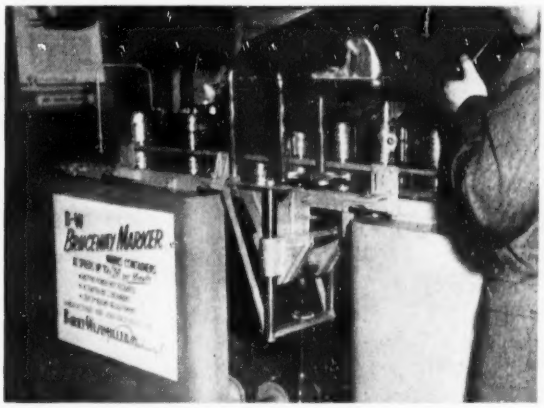
POLISHED and rough castings for canning machinery parts made from both Waukesha metal and stainless steel were displayed by Waukesha Foundry Co., Waukesha, Wis. (89D)



LABELING without glue at up to 150 jars per min. is feature of new lower priced Label-Dri Challenger shown by New Jersey Machine Corp., Hoboken, N. J. (89E)



JUICES are filled at unusually high speeds by new 24-valve PacRite filler and syruper in which valves move up and down and direct flow of liquid against sides of can.—American Machinery Corp., Orlando, Fla. (89F)



METAL-TOP glass containers and cans are marked at speeds up to 600 per min. by new Bruceway unit that handles containers 2¼ to 12 in. high, 3/16 to 7½ in. dia.—Barry-Wehmiller Machinery Co., St. Louis. (89G)

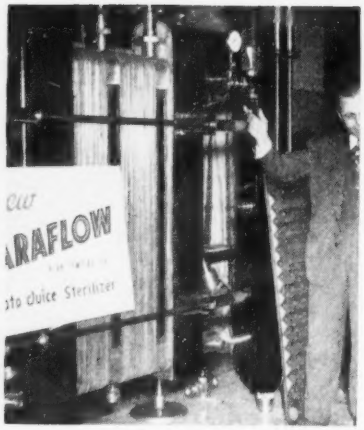
Want more information about any items in this picture article? Just circle key number (in parentheses at end of each caption) on the Reader Service coupon on page 159.

Turn Page for More New Units→

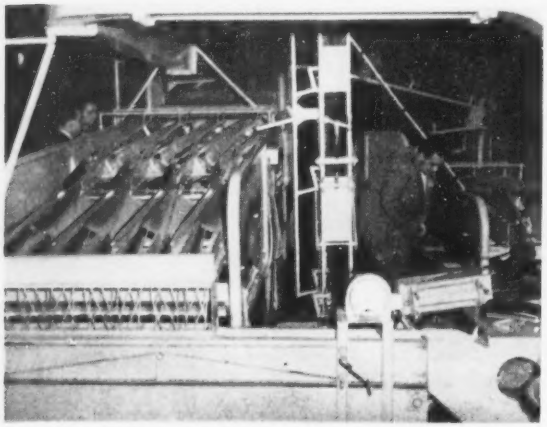
Handling, Processing, Unscrambling

BEVEL seat fittings are converted to gasket CIP type by special tool demonstrated by Tri-Clover Machine Co., Kenosha, Wis. (90A)

LIGHTWEIGHT variable speed drive for small motors affords wide range of speeds.—Reeves Pulley Co., Columbus, Ind. (90B)

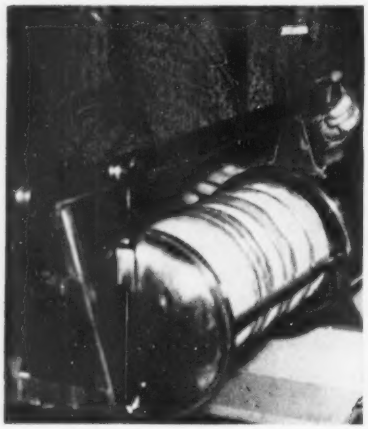


HEAVY DUTY plate heat exchanger sterilizes tomato juice, handles up to 400,000 lb./hr.—Walker-Wallace, Inc., Buffalo. (90C)

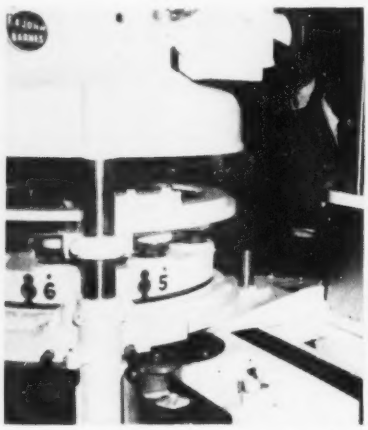


EMPTY CANS are unscrambled 600 per min. and fed open-end-up to discharge conveyor by unit displayed at booth of Dudley Machinery Corp., Mountain View, Calif. Blower (right) moves cans to processing. (90D)

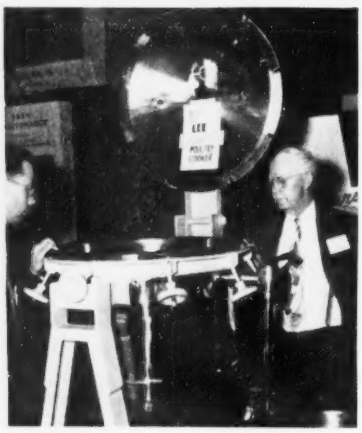
SCALE MODEL (¼ size) of new pea and bean combine demonstrates design changes that won reductions in size and weight of unit as compared to stationary viners.—The Scott Viner Co., Columbus, Ohio. (90E)



MODEL of new pressure-leaf filter illustrates how special retractable carriage and new closure design enable more rapid cleaning.—Niagara Filter Corp., Buffalo. (90F)



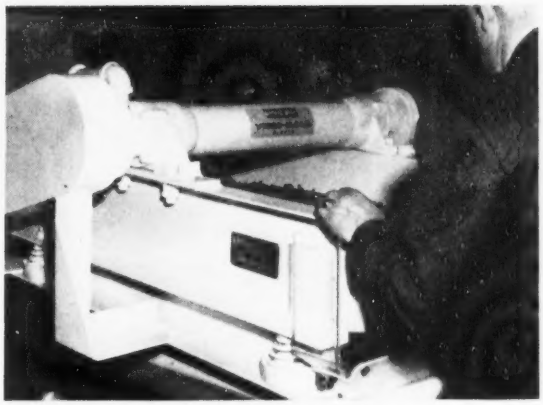
ASEPTIC closing machine for No. 200-404 cans enables high production in small space. Utilizes seaming bars instead of rolls.—W. F. & John Barnes, Rockford, Ill. (90G)



PRESSURE poultry cooker features basket with larger trap door and holes, also special oil removal valve.—Lee Metal Products Co., Inc., Phillipsburg, Pa. (90H)

Closing and Dewatering Machines

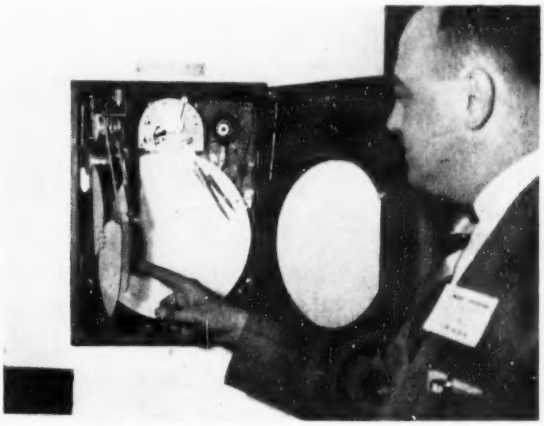
ALUMINUM closures are applied to glass containers at 400 per min. by this 8-head machine displayed by Aluminum Co. of America, Pittsburgh. (91A)



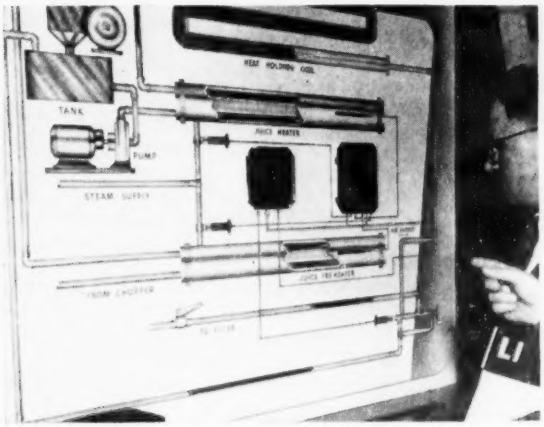
VEGETABLES are cleaned and dewatered faster by new high-fidelity vibrator that has no ledges or pockets.—Link-Belt Co., Philadelphia. (91B)

Instruments Control Processes

MULTI-PURPOSE retort controller provides complete automatic cycle at flick of switch. Compact tray-type control in drawer (below) is wired to handle complex process cycle.—The Foxboro Co., Foxboro, Mass. (91C)



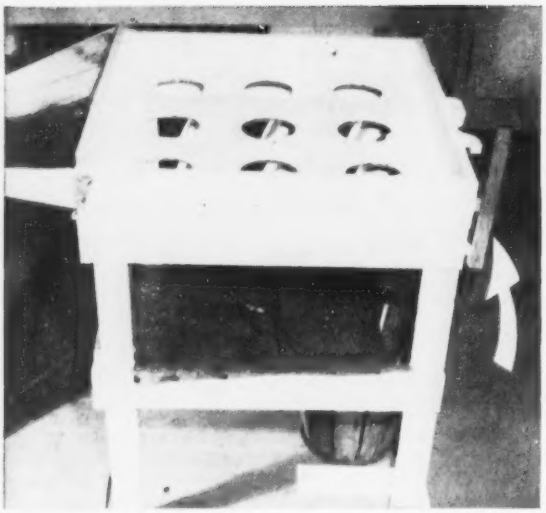
UNIT TIME-TEMPERATURE controller contains two built-in Plexiglas cams, also dual control that permits handling retorting schedules on fixed basis.—Minneapolis Honeywell Regulator Co., Philadelphia. (91D)



SENSITIVE heater-control system was displayed in panel mockup by Taylor Instrument Cos., Rochester, N. Y. Dual controller (right) regulates steam to heater and preheater. Other instrument controls circulation. (91E)

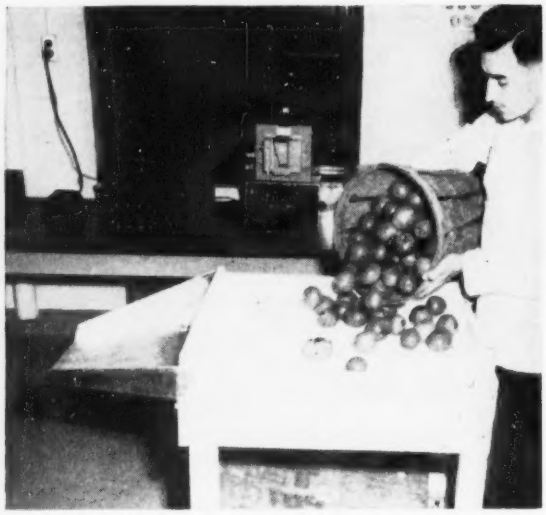
VERSATILE new electronic unit displayed for first time by Tag Div., Weston Elec. Inst. Corp., Newark, N. J., was hooked up to measure varied signals, such as photoelectric effect, power, volts, and amperes. (91F)

Table . . .



TOP HAS HOLES through which sub-sample drops when trap doors are opened by lever (arrow).

And how it works



A RAW products are poured from hamper and spread evenly over top of sampling table.

More Precise Grading With

New Sampling Table

Device sub-samples hampers of raw products thus enabling inspector to take more random samples without increasing quantity of product to be examined

N. W. DESROSIER, F. J. McARDLE and S. R. MILES

Purdue Agricultural Experiment Station, Lafayette, Ind.

A tomato sampling table has been designed and built at Purdue Experiment Station that bids fair to increase precision of the present sampling method without increasing the labor involved.

And, in event there is a move to adopt a unit color and defect system for purchasing the fruit, the table will aid materially in obtaining suitable samples for evaluation.

The table was developed in the course of a study made to evaluate adequacy of the present sampling system (hampers taken at random from a given load at the processing plant) and, if possible, to improve upon it.

Weight and official U. S. grade composition of every hamper constituting the sample from each load of tomatoes received at a nearby cannery, as well as the total number of hampers per load, were recorded during the 1952 tomato season.

The plant received a total of 401 loads of tomatoes, amounting to 1,295 tons. Of these, 669 tons (52 percent) were U. S. No. 1's, 568 tons (44 percent) were No. 2's, and 58 tons (4 percent) were culls. The average load contained 192 hampers.

Variance (s^2) for hampers from the same load was calculated for the samples graded, most of which were composed of three hampers (see Fig. 1).

The F test* was applied to determine whether there was a difference in the variation between large and small loads.

$$F = \frac{\text{average } s^2\text{, over 125 hampers}}{\text{average } s^2\text{, 125 hampers or less}}$$

$$F = \frac{0.00955}{0.00445}$$

$$F = 2.15$$

Since the calculated F value (2.15) exceeds the 2 percent F value (1.89), there is little doubt that large loads varied more than small ones. This is also indicated in Fig. 1. However, the loads with 125 hampers or less generally came from small garden-type plots, or from the Purdue variety trial plots, where picking was closely supervised.

From the above, the following were calculated:

a. Precision, taking 3-hamper sample, loads over 125 hampers—

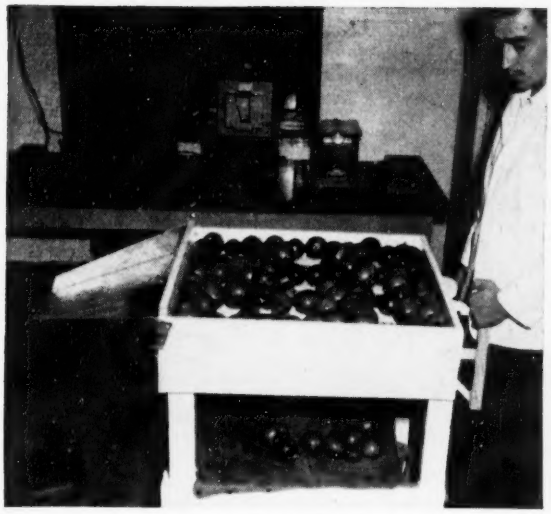
$$s^2 = \frac{0.0095}{3}$$

$$= .0032,$$ and standard error of the average s = 0.057 or 5.7 percent.

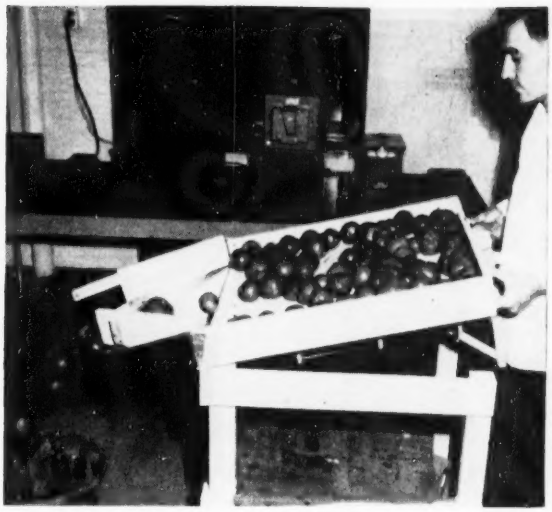
Multiplying 5.7 by 2—the approximate 95 percent value for t**—gives 11.4 percent. Therefore, it is expected that the percentage of U. S. No. 1 fruits in the sample would be 11.4 points, or less, from the true percentage in the load 95 times out of 100. And five times out of 100 the percentage of U. S. No. 1 fruits will

* In analyses of variance, the letter F denotes ratio of larger variance divided by smaller variance. (Reference may be made to D. D. Paterson, *Statistical Technique in Agricultural Research*, McGraw-Hill Book Co.)

** t is the quantity representing the difference between the sample and the mean of the total load. (Reference may be made to D. D. Paterson, *Statistical Technique in Agricultural Research*, McGraw-Hill Book Co.)



B **TRAP** doors are opened and sub-sample falls to burlap sling. Then produce rolls into basket below.



C **TABLE TOP** is hinged to provide for easy disposal of remaining produce into basket (left).

be more than 11.4 points from the true percentage in the load.

b. Precision, taking 3-hamper sample, loads 125 hampers or less—

$$s^2 = \frac{0.0045}{3}$$

$= 0.0015$, and the standard error of the average $s = 0.038$ or 3.8 percent.

In this instance 95 times out of 100, the percentage of U. S. No. 1 fruits would be less than 7.6 points from the true percentage in the load, and five out of 100 the true percentage would be missed by more than 7.6.

The following data (calculated as above) show the effect of different size samples, taken from loads of over 125 hampers, on precision of results:

No. Hampers In Sample	Standard Error (s) In U.S. No. 1's	Precision At 95 Level
2	6.9	13.8
3	5.7	11.4
4	4.9	9.8
5	4.4	8.8
6	4.0	8.0
8	3.5	7.0
10	3.0	6.0
15	2.5	5.0
20	2.1	4.2
30	1.7	3.4

For example, what would be the predicted outcome of a load of 200 hampers of tomatoes having an absolute grade of 75 percent U. S. No. 1, 23 percent No. 2, and 2 percent culls, employing 3-, 10-, and 30-hamper samples?

Here are the results (dealing only with the U. S. No. 1 fruits):

Three-Hamper Sample: 95 times out of 100 the value would fall between 63.6 and 86.4 percent U. S. No. 1's. Five times out of 100 it would fall outside this range.

Ten-Hamper Sample: 95 times out

(*Turn to page 206*)

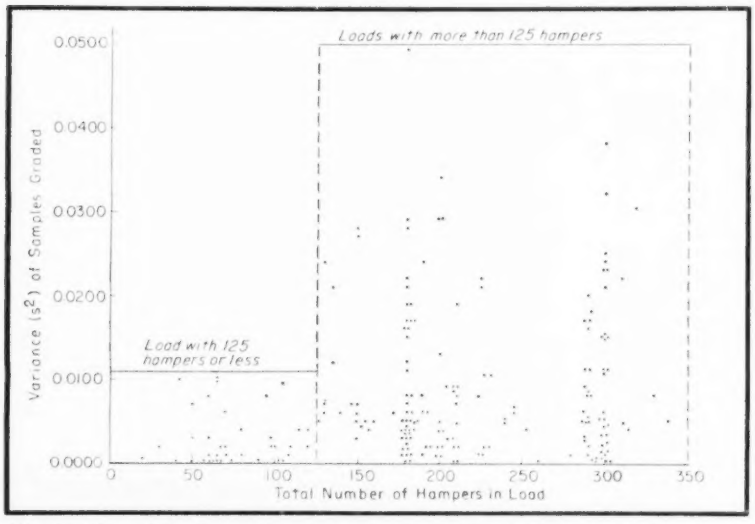


FIG. 1: Size of load was found to be an important factor contributing to variance of samples graded at cannery.

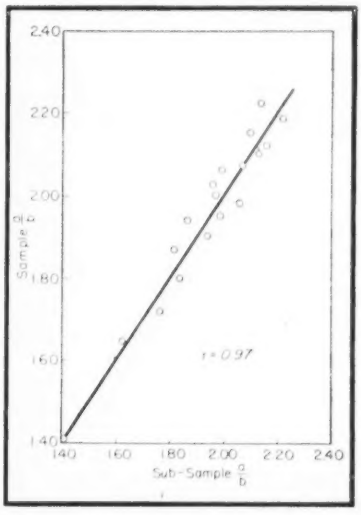
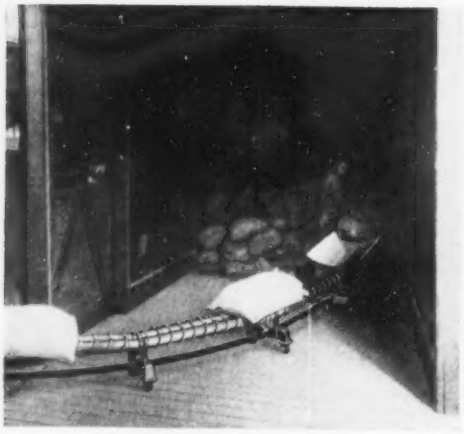
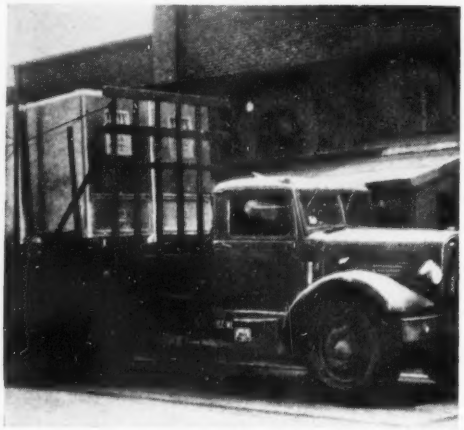


FIG. 2: Color of sub-samples closely parallels that of samples.

A SPECIAL FOOD ENGINEERING REPORT

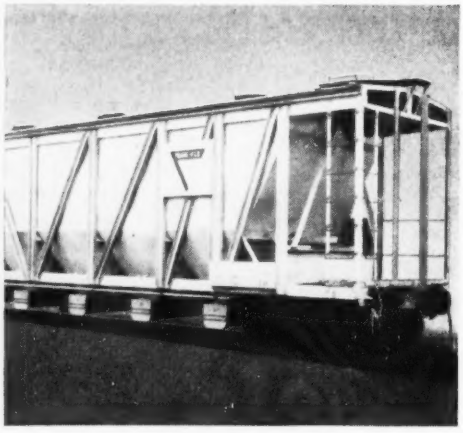


RECEIVING: In Bags



. . . Special Trucks

. . . Bins



. . . Railroad Cars

"Hows," "Whys," and "Wherefores" of

Bulk-Handling Dry Ingredients

W. G. HOSKINS

Engineer, The Glenn G. Hoskins Co., Libertyville, Ill.

Three critical factors are today forcing food plant operators to consider the overhaul of their systems for handling granular or powdery ingredient materials, such as the flour, semolina, sugar, and starch used in the manufacture of their products.

1. Need to keep disposable-sack cost low
2. High spiralling cost for common labor
3. Greater emphasis on food plant sanitation

To brief the picture: Sacks and bags in themselves involve an expense, and it is a continual problem to dispose of the 100-lb. containers used to ship ingredients between supplier and processor. To keep the net cost around 10¢ each calls for a constant fight.

Add to this the increasing difficulty of finding the type of labor needed to unload, handle, and dump these containers.

Further, granular and powdery materials are notoriously

¶ Pressure of climbing costs plus new accent on sanitary standards have pinpointed attention on recent advances in mechanized handling of dry food ingredients.

This report "evaluates the new without abandoning the old." It gives practical observations on equipment involved, its performance to date, operating information, and cost figures—vital reading if you are concerned with modernizing and upgrading your plant's materials handling.

—The Editors

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hard to contain and tend to cause layers of dust—extremely palatable to insects—all over the plant. Also, it is inevitable that sacks retain some material in their folds, resulting in potential insect sites as well as waste.

This report will not attempt to offer a panacea. But it is obvious that a lot of smart people are giving all these factors a great deal of thought. And we will detail here how some of these problems have been answered and others are well on their way to solution.

Before intimately describing some of the important developments in dry-ingredient handling, we need to consider the influence of these basic factors:

A. Distance of plant from supplier

B. Volume of dry ingredient used

C. Whether system is for a new or old plant, and whether existing handling facilities are usable

D. What kind of storage can be used

Following this we will discuss assumed set-ups for plants making macaroni—since this is the field in which we specialize—and we will thus detail the various systems for moving semolina. Naturally, the methods used also apply to other dry ingredients. And the rough cost analyses cited have a similar universatility.

Distance From Supplier

Any consideration of design of an internal dry handling system today must necessarily take into account the current dynamic changes in methods of shipping from supplier to plant. Many believe it is merely a matter of time until it will be feasible to deliver in bulk, rather than in sacks, flour or other powdery or granular material anywhere in the country.

Design of the in-plant system is affected by the delivery method employed. If the materials come in sacks, provision must be made to unload from the car, and to store and later unload into the handling system. A fairly simple setup can be used for conveying into hopper storage over the process.

If General American Transportation Corp. Trans-Flo cars are used, it is necessary to have a high-suction pneumatic conveying system capable of exerting a suction of 10-12 in. of mercury to unload the carrier, and having capacity to deliver material into bulk storage at rates varying from 15,000 to 40,000 lb. of material per hour.

Feasibility of using this system is determined by the rate at which these cars can be turned around between the mill and the plant of the user. The latter rents the cars at a current rate of $295 each per month and the lease is on a 10-yr. basis. If it takes too long to turn a car around, the savings occasioned by elimination of the sack, labor, and siftage losses are negated by the car rental charge.

The "Tote" system is another excellent sanitary means for shipping between mill and user and is in widespread use at the present time. It consists of filling 3,000- to 3,500-lb. capacity aluminum bins with material, and transporting them by means of trucks, special railroad cars developed for the purpose, and lift trucks. At the user's plant the bins are stored until the material is required and are then mounted on special equipment for unloading (FE Sept. 1951, p. 83).

Use of this system is limited to plants quite close to the mills. It is not suitable when the plant is over 100 miles away because return-freight expenses eat into the savings.

The Gramm Trailer Corp. and the Trailmobile people have developed special bulk handling trucks for transporting flour. Gramm trucks are equipped with Fuller Air-Slides for unloading—the latter being devices that cause flour or other materials to flow down an inclined surface by aerating the material from underneath.

The truck can be unloaded into an Airveyor system equipped with a special high-suction nozzle, or pressure feeder, or into a hopper which feeds into some other type of conveying system.

Other hopper-bottom trucks that can be employed use various types of unloading mechanisms involving slightly different principles of operation.

Volume a Factor

Granted, to install the type of equipment needed to unload and store dry ingredients in bulk is expensive. Consequently, a careful analysis must be made of the amortized cost of handling equipment.

If an investment of $50,000 for equipment is written off at $5,000 per year, amortization on 1,000,000 lb. of goods handled would cost 50c. per cwt. Certainly this would preclude any savings possible through use of a bulk-rail pneumatic system. On the other hand, putting through 10,000,000 lb. per year would result in an amortized cost of 5c. per cwt.—which would very likely result in substantial savings.

On the surface, it would seem that a small producer might be left out of the bulk handling picture because it would cost him so much to install equipment for unloading cars. And this is pretty much the case today. However, it is hoped the future will bring some sort of a combination system in which bulk deliveries will be made to central stations equipped for unloading.

Such stations would provide trucks, Tote Bins, or other devices, for delivering the ingredient in required amounts to users in that area. This would cut down the amount of handling equipment needed by the user, and would also eliminate the necessity for a rail siding—a very real problem to a large number of users. These systems are now in the planning stage and seem to offer a reasonable chance of success.

New Plant or Old?

A modern pneumatic handling system can be engineered into a new building at a cost no greater, and quite possibly less, than that for the conventional screw conveyor-bucket elevator type of equipment.

Any new industrial plant that uses dry ingredients in quantity should be equipped with a system for unloading bulk cars and for storing adequate amounts in bulk. If the new plant doesn't use enough to justify bulk car unloading equipment, it should still try to provide for future use of bulk storage and bulk handling equipment of some type, even though the original setup is for sack handling.

In an older building where consideration is being given to modernization of dry handling equipment, the following factors should be carefully analyzed:

1. Availability of a rail siding
2. Usability of present equipment
3. Type of storage that could be used

If there is no rail siding, it would certainly be unwise to install the high-cost, high-pressure pneumatic conveying equipment. If it is felt that more modern equipment is justified, low-pressure pneumatic, Raedler or Polyplane units, or screw conveyor and screw elevator of modern design (but lower capacity) would be perfectly suitable and could be installed at relatively low cost.

Where there is no rail siding, chances are that use of dry ingredients in bulk would depend on employment of either Tote Bins or bulk trucks. As pointed out earlier, the bulk trucks can be unloaded with the Airveyor system. However, the urgency of truck turnover may not be as critical as with the rail cars, so lower-capacity equipment could be utilized in unloading.

In many analyses, pneumatic-system savings on sacks, labor, and siftage often seem more substantial on the surface than they will actually be. In other words, a plant that has usable handling equipment should think twice before making a change.

Analyses have shown that savings can be anywhere from a negligible amount to as much as 10¢ a sack—even more in the case of very large plants close to their mills.

Storage Requirements

A dry handling system that unloads bulk cars or trucks must have facilities for bulk storage. Rule of thumb for determining storage capacity needed for a macaroni plant is that there should be facilities for at least five days' production plus one day of storage capacity for each day of average travel time that the plant is distant from the mill.

In other words, if a plant uses 80,000 lb. of semolina a day, and it takes a railroad car three days to come from the mill, the plant should have 5 x 80,000 plus 3 x 80,000, or 640,000 lb. of storage capacity. This holds true whether material is stored in sacks or in bulk, but can be varied on the basis of other factors.

Sack storage is very flexible. If a plant runs out of normal storage space, sacks can be transferred to some other part of the plant.

Bulk storage systems are less flexible and, in most cases, cost somewhat more than equivalent building space for storing sacks.

Bulk flour and several other "drys" can be stored in either horizontal or vertical bins, indoors or out. In many existing buildings it is impossible to install any other than the horizontal type bin with a distributing screw conveyor in the top and a discharge screw in the bottom. In numerous cases it is not advisable to cut away floors and move machinery to put in vertical storage.

However, experience has shown that horizontal storage bins cost up to twice as much per cubic foot of space as vertical round bins. The horizontal bins are also somewhat more difficult to keep clean.

GATC is presently testing an outside storage silo for flour and other granular products. This company's experience with the bulk car has shown that condensation of water in flour stored outside is not as much of a problem as originally believed. The outside silo is being developed because storage space within plants is often limited and building costs have become so high that buying of outside storage space may be cheaper.

The new outdoor bin is of metal and has insulated walls. Its roof is equipped with a circular pipe heating coil designed to keep the air above the floor heated sufficiently to prevent condensation. This bin is now undergoing tests and preliminary results have proven quite satisfactory.

In-Plant "Movers"

There are numerous distinct sets of machinery that can be used as dry "movers" in the plant—basket elevators, screws, Redlers, Polyplanes, and pneumatic conveyors. Of the latter type, one is what might be called the low pressure pneumatic system, consisting of duct, cyclone collectors, centrifugal blowers, and filters. The low pressure system will operate on a static pressure of between 5 and 25 in. of water.

Another type might be called the high pressure pneumatic system, comprising the same basic classes of machinery as the low pressure system, but operating at around 8 psi. pressure. This equipment has to be used where flour is moved in bulk cars from the mill, principally because the unloading nozzles on the bulk cars require quite a high suction to operate properly.

A relatively recent, interesting development of the high pressure system is the so-called "In-Plant" mover in which granular material is "charged" into a 3 in. conveying tube. Ratio of air to flour in this system is very low, and material can be fed directly into bins with only mat type filters on the discharge side of the bins to remove fines from the air. Such systems are built by The Fuller Co., Baker-Perkins Co., Read-Standard Corp., and possibly others. They operate at pressures up to 10 psi.

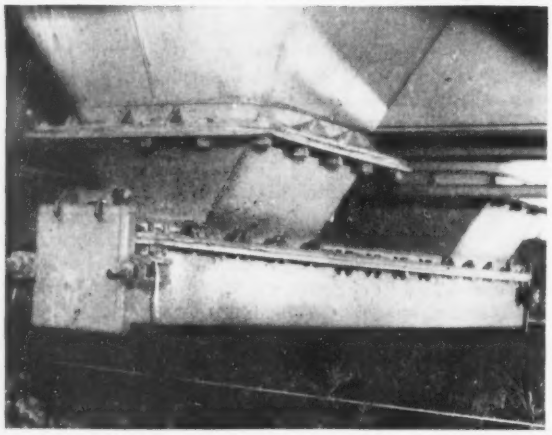
Old Methods Still Work

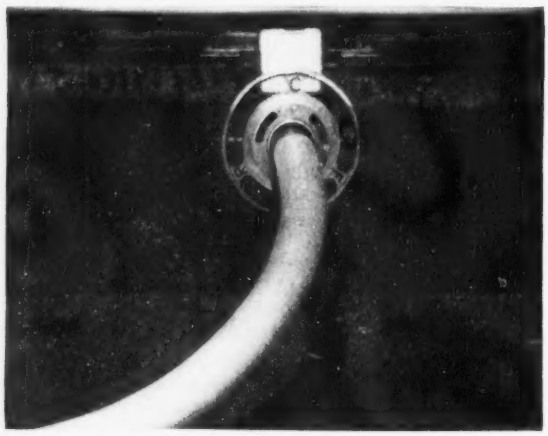
While there has understandably been a great deal of interest lately in the new pneumatic systems, it will still be a long time before we see the disappearance of the old standby screw conveyors and bucket elevators, especially for granular materials other than flour and food products.

Admittedly, some of the old wood-encased screw conveyors and bucket elevators present the meanest sanitation and maintenance problems. Much of the old all-metal equipment has been put together in such a way that it is a major overhaul job just to get inside the leg of the bucket elevator to see how the bugs are growing.

This type of equipment is disappearing rapidly from the

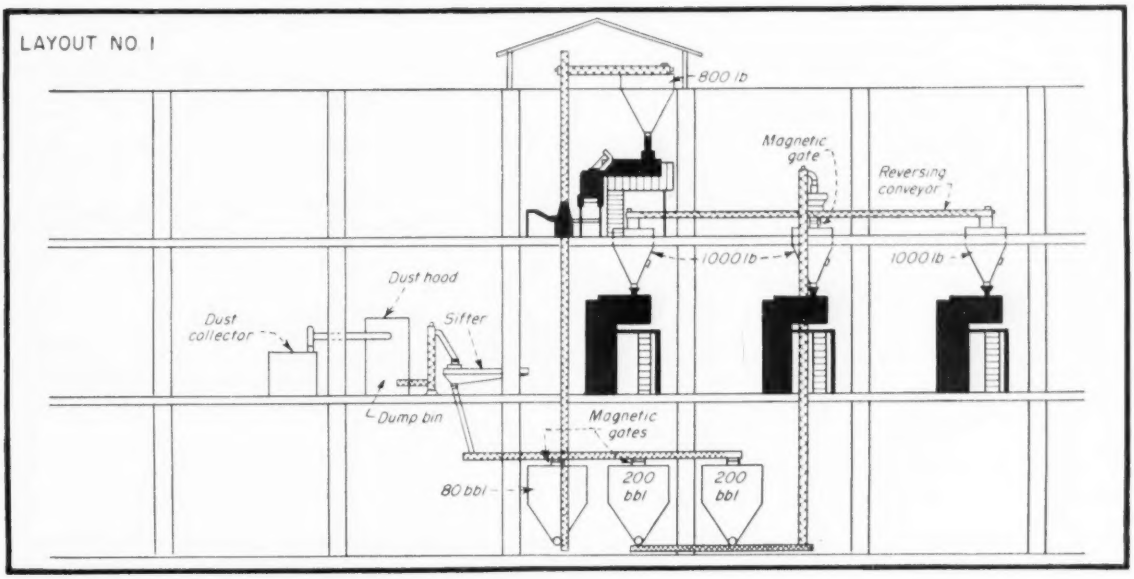
Details on bulk car unloading components

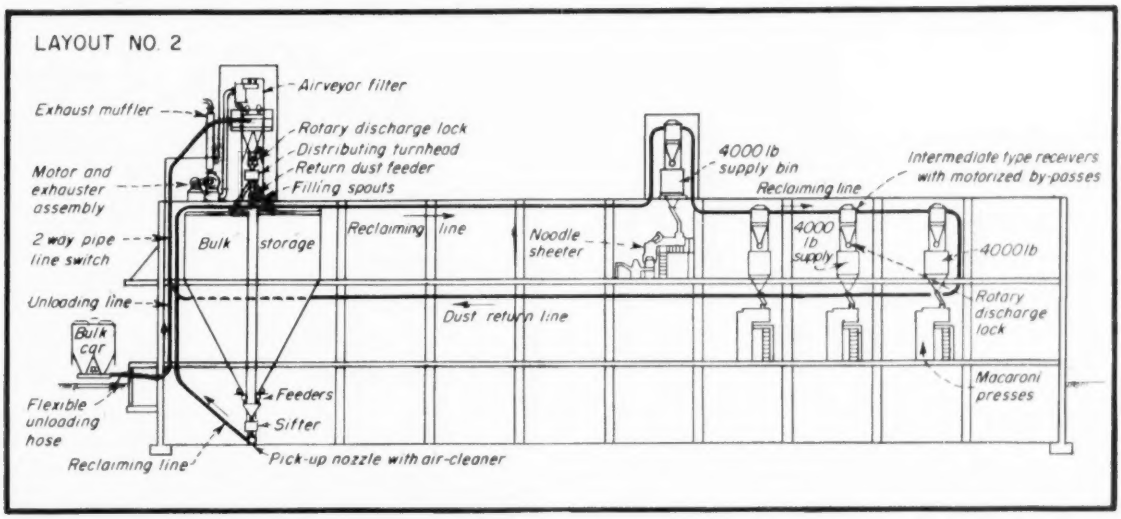


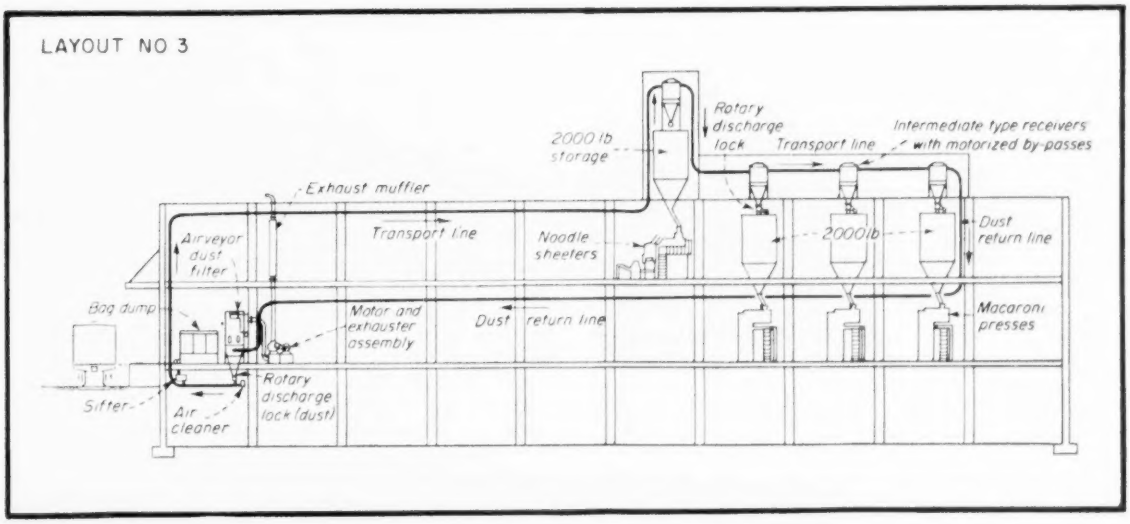


CLOSEUPS of rotary unloading elements. Left: Door in closed position and railroad seals in place. Right: Flexible unloading hose attached to an adapter. It permits selective discharge of hopper sections.

Three Macaroni Plant Layouts







market. It is being replaced by screw conveyors having bottoms that can be dropped off quickly and easily for cleaning, and bucket elevators arranged with round-cornered enclosures and adequate access panels that are easily removed.

It is going to be difficult to get away from some of the obvious advantages of conveying flour with screw conveyor equipment, especially for very short distances.

For one thing, flour can be put where it is required without the use of the tall cyclone collectors and bag filters necessary for some of the pneumatic systems. Flour is moved through the screw conveyor or bucket elevator very gently and deposited without a sudden slowing down at the point of use. Storage of any type can be used, and the horizontal bulk storage bins are readily fitted in existing buildings under rather low ceilings.

Total connected horsepower for a given weight of material handled is less with the screw type conveying system than any we have investigated.

It is quite conceivable that a single system could use high pressure, low pressure, and screw conveyors to do a job of bulk moving. For purposes of illustration, however, we will now "set up" three sample plant layouts to display bulk handling equipment of each type alone. Thus, it will be possible to compare each from the standpoint of initial cost, efficiency, operating cost, and sanitation.

Systems Described

Plant layout No. 1, The Dump-Bin system: In this sample macaroni plant employing a bag dump bin and screw type conveyors to distribute its semolina, the only labor required for the system would be a crew in the car to unload sacks onto a pallet and a fork-lift truck operator to move the pallets from the car into storage.

There are several advantages gained by using pallets. First and most important is the reduced handling cost per sack—a single lift truck operator can handle 20 sacks on a pallet at one time.

Pallets also have certain advantages over skids—storage space can be conserved by piling one pallet load on top of another.

Size of pallet seemingly most suitable for handling 100 lb. paper sacks is 36x48 in. This pallet will hold three 100 lb. sacks per layer, two sacks parallel with the 48 in. dimension and one parallel with the 36 in. dimension. Pallets are generally constructed of wood, and some are arranged so the lift truck operator has the choice of picking up the pallet with the load or picking up the load and leaving the pallet behind.

Skids differ from pallets in that they are, for the most part, arranged for use with hand trucks. They are usually made of wood with angle iron frames and supporting legs.

The dump bin which would be used is a standard type, having sloping sides and equipped with a screw conveyor at the bottom.

In many existing installations, dump bins are among the worst offenders from a sanitary point of view. For one thing, the men dumping the flour may not be the most careful people in the plant, hence flour may sometimes slop over the edges of the bin. This flour, along with that fluffed up when the bag is dumped, gets around and under and on top of everything, and in all the crevices that are available. Any sharp corner, hidden ledge, crack or crevice is a potential home for a hungry weevil.

New equipment and facilities are much simpler in construction. They put everything out in the open where it can be vacuumed or brushed clean.

A well-designed dump bin permits access from every side. An excellent type now on the market has bag rests on the front that are quickly detachable, exposing the entire underside of the bin. Hidden crevices, ledges and cracks have been eliminated wherever physically possible.

The screw conveyor along the bottom of this bin can be equipped with a drop bottom housing that can be taken off quickly for cleaning. These bins are made in almost any size desired, the specification depending on how they are to be tied in with the rest of the system.

The dump bin in our layout is equipped with a dust hood, exhaust fan, and bag filter.

Exhausting air from a hood over the dump bin keeps the fluffed-up flour from spreading around the area. During operations, air is always flowing into the opening in the hood and through the fan. The airborne flour can be collected by several means, one of the most economical being the bag filter.

The bag filter consists of a relatively large settling chamber, above which are located a number of tightly woven cloth bags. Air from the dust hood passes into the settling chamber, where some of the larger particles settle out and then the air comes up through the bags where the fines are removed.

Most commercial bag filters come as near to being 100 percent efficient as any type on the market. We recommend use of these filters, or a mat type, rather than a cyclone collector only, because in most cases, air passing through the bag filter can be returned to the room, thus preventing loss of heat during the winter months.

After leaving the dump bin, semolina or flour passes through a sifter. We prefer location of the sifter near the dumping point if physically possible. Thus, any bugs or insect eggs can be removed from the flour before being carried too far through the plant. We advise sifting both at the beginning of the conveying system and again at the entrance to the presses, especially if bulk storage is used somewhere in between.

The screw conveyor in this system feeds through right-angle discharges into three horizontal storage bins.

Value of the storage bins in the sample plant is that there will be certain times during rush seasons calling for operation of more than one shift. During these times, the flour dumper, with a helper, will be able in one shift to fill both the 40,000 lb. storage bins and take care of the shift requirements. In this way, it is not necessary to have a man at the dump bin during the other two shifts.

Second System Detailed

Plant layout No. 2, The All-Pneumatic System: This layout shows arrangement of equipment in a system primarily employing the new bulk flour cars. It is based on the conveyor maker's idea of how the units should be adapted for use with bulk transfer equipment.

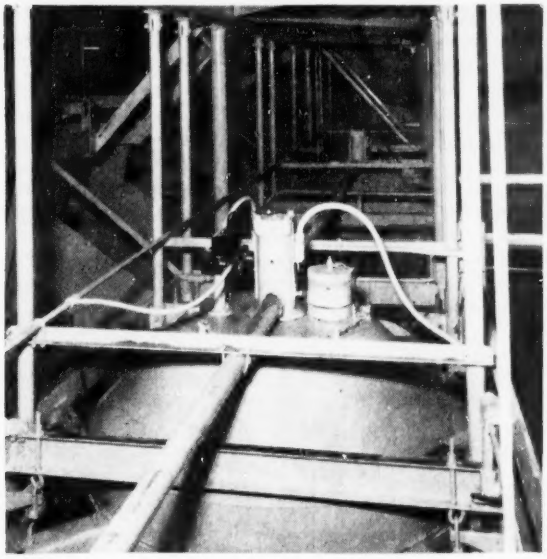
Our sample plant is 1,200 miles and five days away from the mills. In order to operate on a safe and efficient basis, it is necessary to provide the same amount of storage space as was required when flour was shipped in sacks. This amounts to 400,000 lb. And storage bins are outside the plant.

Prime mover for this system is the high pressure blower, which is mounted atop the storage bins for pulling air from the top of the cyclone collector. This blower maintains a suction on the collector, and hence on the exhaust duct leading to the car, inducing flow in this latter duct. The duct to the car is partly made up of a flexible section that can be moved from one nozzle to the next by the operator.

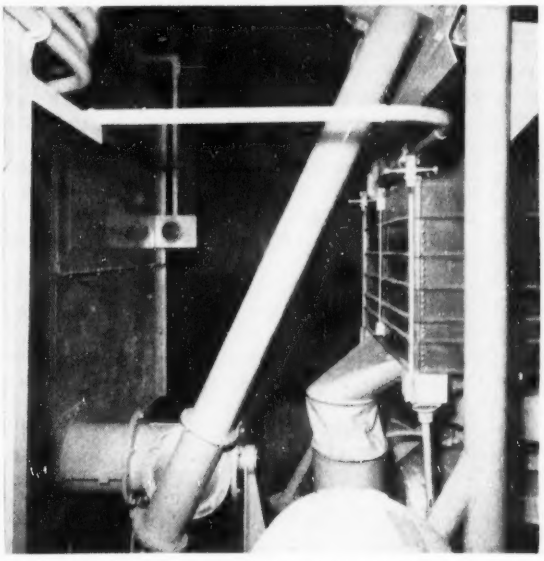
Remainder of the duct is of the heavy permanent type, made up with air-tight joints perfectly smooth inside. It is self-cleaning because of the wiping action of the flour and the air across exposed surfaces.

In this case, the cyclone collector is a special type. Air

THIS COMPACT SYSTEM, developed by Baker-Perkins for in-plant conveying, comprises (left to right) a blender with sack cleaning attachment and dust collector, screw elevator, **sifter, storage bins, and bin filter unit.**



DISTRIBUTION of material to various bins is controlled by use of two-way valves seen atop of bins.



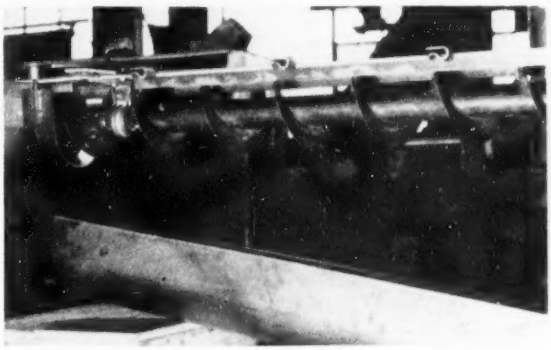
QUALITY is protected by this Allis-Chalmers, all metal gyratory sifter (right). Hooded dump bin is at left.

comes into the collector in the lower portion, which is built like a conventional, efficient cyclone. Most of the product being handled settles out in this chamber. The fines go upward and are stopped by a special bag filter located in the upper section of the separator.

Filter Bags Kept Clean

In most respects, the bag filter in this unit is the same as that described earlier for the dump-bin exhaust system, except that here the filter is divided into four quadrants, one of which is closed off at a given time by a rotating valve mechanism. The closed quadrant is automatically shaken by an electrically driven unit and the fines from the inactive section are returned to the hopper below.

The shaking action is further augmented by a reverse current of air. In this way, bags are continually kept



DROP BOTTOM of sanitary-design Readco screw conveyor permits quick and easy access for thorough cleaning.

clean and the necessity for periodic-scheduled shaking is eliminated, manual or otherwise.

On this cyclone, the bottom hopper is provided with a rotary airlock. Flour passing through the lock is fed via a turn-head into whichever bin is desired.

Problem of infestation in the storage bins is minimized, judging by actual experience, due to the rough ride the bugs get in traveling through the pneumatic conveying duct.

The receivers over the presses are efficient double-stage cyclone separators without the more expensive bag filter arrangment. Whatever fines may go over from receivers are removed in the big filter.

Third System

Plant layout No. 3, The Pneumatic In-Plant Conveying System: This layout shows how the same type pneumatic system can be used for conveying within the plant where flour is received in sacks. Elements of this system are very much the same as described above, except that no provision is made to unload cars.

A standard type dump bin, with a sifter installed underneath, is used to feed semolina at a steady rate into the conveying duct.

Conveying air is introduced into the duct by suction, entering through a filter up stream from the feeder. A hopper built into the duct permits flour to pass directly into the air stream.

For this layout, vertical storage bins have been selected to store flour for more than one shift a day.

Air switches—devices for connecting any one of a number of flexible pipes to the main feeder lines—control distribution.

Both of the above described high-pressure pneumatic conveying systems operate at pressures from about 3 to 10 psi. The in-plant system with its small conveying lines cannot unload the bulk car, but it will convey at a rate of over 200 lb. per min.

The Sprout-Waldron type of conveying system could also be used in the system shown. This is known as a low-pressure pneumatic system. Equipment required to do the job would consist of standard type duct-work leading from the sifter to high-efficiency cyclone collectors above storage bins. These collectors would be under suction provided by a steel-plate, radial-bladed exhaust fan which could draw air from all four cyclones.

In this case, all material except very fine dust would precipitate out in the cyclones. Air and fines would go over through the blower into a bag filter similar to that described earlier.

Operational Costs

An anavlsis of any plant system has to include a careful study of the cost of operation. This study should be made coldly—in the light of known facts, rather than hoped-for results.

Any specific analysis attempted is of course arbitrary, since agreement is not expected from everyone on such factors as labor costs, overhead, siftage loss, bag cost, and so forth. However, at the risk of being called wrong, we feel that our following outline of the relative costs of operation of the sample plants will be helpful.

For cost purposes, the sample plant can be analyzed on the basis of comparison between the system that handles material in bulk and the system that handles material in sacks. There will be no essential difference in cost of operation between the system that handles sacks pneumatically and the system that handles sacks by means of screw conveyors and bucket elevators.

For purposes of this calculation we are setting the wage rate, including overhead and fringe benefits, at $1.50 per hour. And these are the further assumptions: Production, 10,000,000 lb. per year; plant location, 1,200 miles from the mill; and bulk cars making 1½ turn-arounds per month and kept in constant operation.

Sacks vs. Bulk-Cars

Below we give a breakdown of costs for sack handling (cents/cwt.):

Cost of sacks, net	11.00
Power, 250 kwh./car of 800 sacks	0.30
Freight on sacks, ¾ lb./sack @ $.70/cwt.	0.53
Siftage and shrinkage, ½% @ $7.00/cwt. delivered cost of semolina	3.50
Labor, unloading car to storage, 40 sacks/man-hour @ $1.50/m-h.	3.70
Storage to dump bin, 40 sacks/man-hour @ $1.50/m-h.	3.70
Disposal of sacks, 1,000 sacks/m-h.	.15
Total costs (c./cwt.)	22.88

And now for comparison, here is a breakdown of costs for bulk-car handling (cents/cwt.):

Labor, unloading into bulk storage—4 man-hours/car of 1,100 cwt. @ $1.50/m-h.	0.55
Power, conveying from car to storage to presses	0.60
Siftage and shrinkage, .05% @ $7.00/cwt.	0.35
Car rental, $295.00/month—1,650 cwt./mo.	17.90
Total	19.40
Less $.325/mile railroad allowance, 3,600 mi. ÷ 1,650 cwt.	7.00
Total cost (c./cwt.)	12.40

The above indicates a possible saving of 22.88 minus 12.40, or 10.48c./cwt. On the basis of 10,000,000 lb. per year, the indicated savings, before taking amortization of equipment into account, would amount to $10,480 per year.

In our normal practice, an investment paying for itself in five years is considered good. On this basis, then, it would seem feasible for our assumed plant to invest up to $52,400 in equipment for unloading bulk cars and storing flour and semolina supplies.

Investment Costs

Sometime ago we obtained, as a matter of interest, tentative figures from equipment manufacturers on the sample plant layouts. At this writing, these figures amount to nothing more than intelligent guesses, but they do offer some idea of comparative costs on equipment:

Layout No. 1, arranged for storage in sacks, including conveying and storing equipment, lift truck and pallets: Estimated cost $55,000.

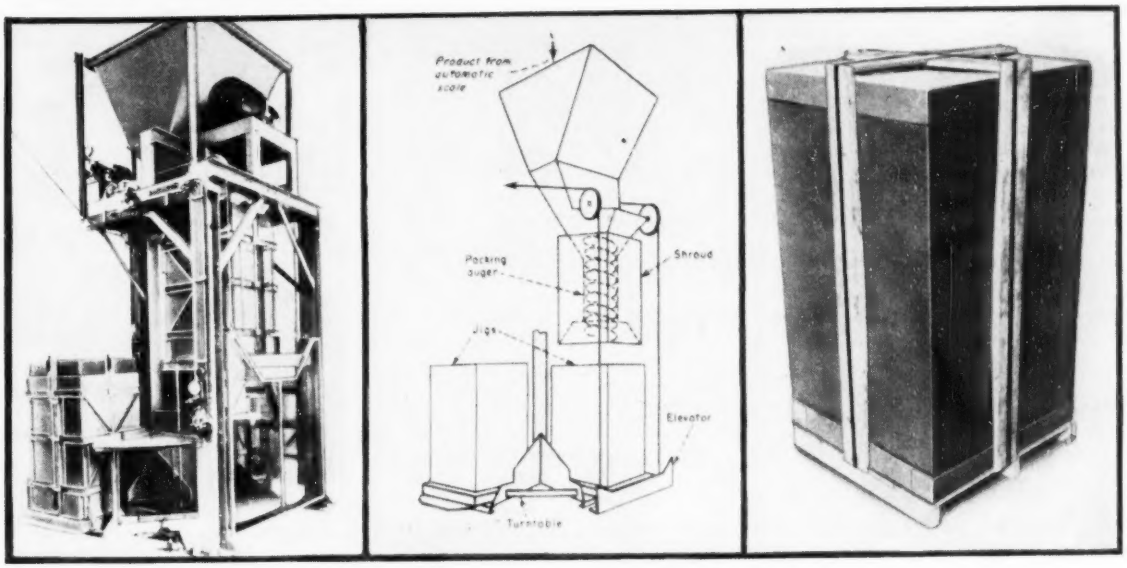
Layout No. 2, pneumatic conveying system, arranged for automatic unloading of bulk cars, with bulk storage tanks for 400,000 lb.: Estimated cost $65,000.

Layout No. 3, pneumatic conveying high-pressure type, with dump bin for handling flour received in sacks, including lift truck and pallets: Estimated cost $30,000. An "In-Plant" system might also cost about $30,000.

Status of flour and granular materials handling currently is such that it pays to proceed with caution in making any substantial investment. It is being demonstrated that bulk handling and bulk storage are very practical and workable, resulting in more sanitary food plants and more efficient operation.

Hope, as stated earlier, is that developments in the next few years will include establishment of a system for central unloading and warehousing of material received in the bulk cars and local distribution by means of Tote Bins and tank trucks to using plants.

NEW EQUIPMENT & SUPPLIES



Packs Bulk Foods in Giant Cardboard Boxes

Savings in storage, labor and packaging are claimed with use of new packer that automatically weighs and delivers bulk food products to giant-size cardboard boxes. A two-man crew running new packer is said to turn out one 2,000-lb. fully-packed, ready-to-ship box every three minutes—20 tons of product per hr.

Basic parts of assembly are a hopper scale for weighing a loading hopper, a turntable that holds four 3 x 3 x 5 ft. cardboard boxes and a packing auger. While one box is being filled, the other boxes are being prepared, strapped or taken off turntable. Finished container is supported on sides by wooden staves, on botton by a pallet, and on top by a cross-piece.

Recently designed by Container Corp of America, cartons may be collapsed and returned to packer for reuse. Flour millers, for example, can use a carton up to four times.

Here's how it works: A 12 ft. turntable, mounted on ball bearings, has four steel jackets, or jigs, set 90 deg. apart. These jigs reinforce and locate carton during packing. Operator first places a pallet on roller-floor of jig and then installs a vertical wooden reinforcing stave down middle of each side of jig. Staves are held in place by retractable spring clips in jig. Operator places an empty carton on pallet, then closes and locks doors of jig with toggle latch.

After this preparation, operator rotates turntable a quarter turn to packing station. A latching mechanism automatically positions carton under a 12-in. packing auger driven by a 20 hp. gearhead motor.

An elevator run by a specially designed hydraulic system then raises carton and jig to packing position. In packing position, shroud covering auger is inside container. Operator can manually control entire ascent of carton and jig.

Auger packing may or may not be used. For finely ground materials such as flour, it is necessary.

When jig reaches top of its travel, an electrical interlock switch discharges hopper scale and starts auger. Product is forced into carton and packed by auger both vertically and horizontally under 2,000 to 3,000 lb. total pressure.

As carton fills, it is forced downward until it finally returns to its original position on turntable. At this time carton is fully loaded and packed. Proper packing pressure is automatically maintained at all times.

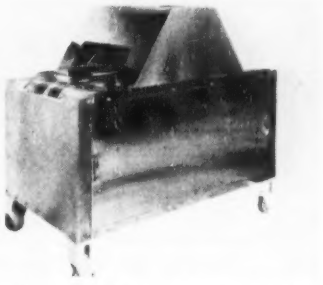
When packed, an operator rotates turntable a quarter turn until carton reaches strapping station. Cover is put on carton and, on top of that, a wooden crosspiece whose ends match vertical side staves. Carton is now ready for strapping. Using channel guides built into each jig, operator places two steel banding straps around carton staves and pallet, then tightens and seals them.

After strapping, operator rotates turntable again. At unloading station, he opens doors of jig and strapped carton is rolled out onto a conveyor to be picked up by a fork truck.

In hopper-scale filling operation, a continuously running screw delivers product from storage silos into a two-compartment hopper. Each compartment holds a carton load of product —1,000 to 2,000 lb., depending on density of product. Stream of incoming material pours into one compartment. When compartment reaches pre-set weight, stream is automatically diverted to adjacent compartment. One compartment loads while other unloads.—*Richardson Scale Co., Clifton, N. J.*

Circle 101A on Reader Service Card

Automatic Pan Greaser Is Compact, Portable



Savings in labor and faster production are claimed with use of new automatic pan greaser. (*Turn page*)

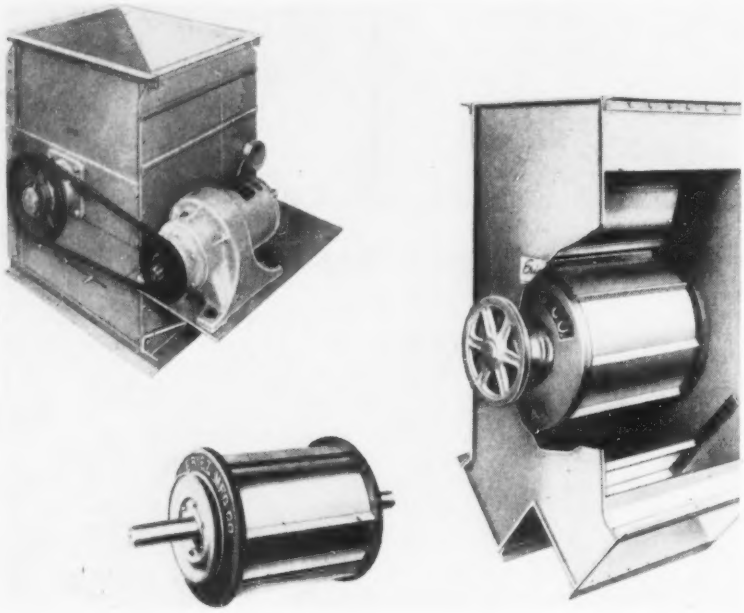
Unit is reported to handle any size pan and can be regulated to dispense as little as 1 oz. of grease per 100 loaves of bread. Machine distributes grease evenly around inside of pans. Unit is sturdily built and stainless steel enclosed. Portable and fully automatic, it can be incorporated into production lines and can be regulated to any desired speed.

Metering piston is quickly and easily adjusted for dispensing large or small quantities of grease. Sides of machine are sloped so excess grease can be returned to grease tank. All moving parts are raised above floor to keep out dust, dirt, moisture. Raised construction also permits easy cleaning under machine.

Dimensions are: Width 30 in., length, 54 in. Conveyor belt height is 32 in. from floor. Weight is 500 lb.—*Imperial Machine Co., 925 N. Darien St., Philadelphia 23.*

Circle 101B on Reader Service Card

Magnetic Drum Separators Improved Seven Ways



Increased efficiency is claimed for new magnetic drums incorporating the following seven improvements:

Changeable sheave sizes for various operating speeds; stainless steel shells that resist pitting and corrosion; dust-tight construction; light-weight, rigid, cast aluminum sides; adjustable feeder assemblies; smooth running and oil-sealed bearings, and extended discharge ducts.

Drum, available with or without housing, consists of a revolving cylindrical shell within which a stationary high-powered Alnico V permanent magnet is located. Material is fed into drum hopper where flow is regulated by a feeding device.

As material reaches drum, unit's magnetic field attracts—and holds—ferrous particles to revolving shell which carries material through stationary magnetic field. Non-magnetic material falls free from shell at its natural tangent point, while ferrous particles are held until carried beyond a divider and out of magnetic field.

New unit is feeding device as well as a magnetic separator. A reverse feed is employed with material being fed against direction of rotation. This feed method utilizes full effect of drum's magnetic field; eliminates glancing and back leakage of material. An adjustable reflector regulates and evenly feeds material at any desired speed and depth. Shell rotates on dust-proof enclosed ball bearings.

Improved models are available complete with motor. The 12-in. model has a ½ hp. and the 18-in. model has a ¾ hp. U. S. Synchro-gear 68 rpm., 3 phase, 60 cycle, 220-440v. motor which can be mounted on either side of unit.—*Eriez Manufacturing Co., Erie, Pa.*

Circle 102A on Reader Service Card

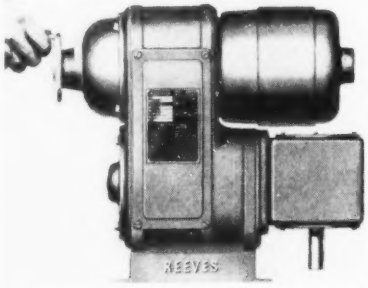
Light Trolley Conveyor Is Simple to Install

Simplicity of wearing parts, minimum maintenance, and ease of installation are features claimed for new lightweight trolley conveyor.

Called "Chainveyor" it is a light-duty, fully enclosed continuous chain conveyor designed for overhead service. Short radius curves and straight tubular track sections can be readily installed, making carrier highly flexible. — *Mathews Conveyor Co., Ellwood City, Pa.*

Circle 102B on Reader Service Card

Compact Drive Assembly Has Rt.-Angle Reducer



Savings in floor space are reported possible with use of compact drive assembly combining in one space-saving unit any standard NEMA frame, type "C", face-mounted motor; a speed-varying mechanism; and the new right angle, worm gear reducer.

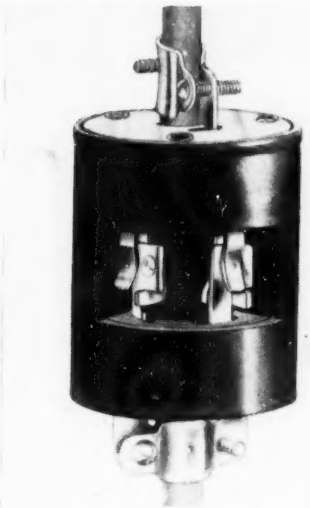
Output shaft drives up, down or at right angles in horizontal type of units and drives down or at right angles in the vertical model. Right angled shaft arrangement makes it possible to put fractional hp. motordrive flat against, directly above, or below driven equipment.

Angle reducer, an alloy steel helical worm and bronze gear, is ruggedly built to withstand heavy duty, continuous operation. All gearing and bearings are adequately lubricated and case is sealed to provide protection against oil leakage.

Handwheel control is standard on these drives but electric remote and mechanical automatic controls can easily be applied.—*Reeves Pulley Co., Columbus, Ind.*

Circle 102C on Reader Service Card

Interlocking Connector Has All-Rubber Body



Turn-Tyte's new principle in interlocking electrical connectors is claimed to have made possible first all-rubber model specifically designed for industrial use.

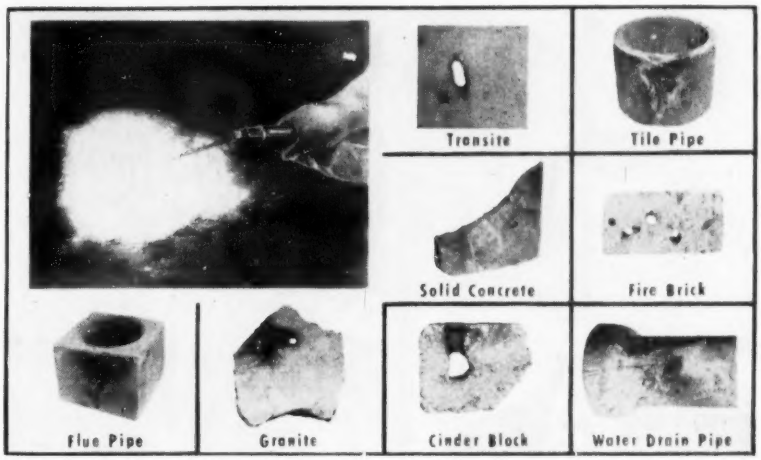
Cut-away photo shows principle in action. Special right-angle lugs at tips of female contacts engage and support male blades, thus establishing a strain-proof, double-locked connection.

New feature combined with all-rubber body is stated to eliminate danger of body-breakage, chipping and broken connections due to impact, pressure, or vibration. Rigidly tested, rubber body is reported not to crack, warp or deteriorate, and will provide shock-proof safety under extremes of temperature and humidity.

Item is offered in five different models—2 wire; 3 wire; 4 wire—rated for 10 and 20 amp. service. All are equipped with rust and corrosion-resistant cord clamps. Underwriters' listed and CSA approved.—*Rodale Manufacturing Co., Inc., Emmaus, Pa.*

Circle 103A on Reader Service Card

Electric Arc-Rod Process Cuts Masonry Materials



Stone, concrete and refractory materials can now be pierced and cut through use of a new process called "DynArc" employing an arc rod upon non-conductive material and without a ground connection, state makers.

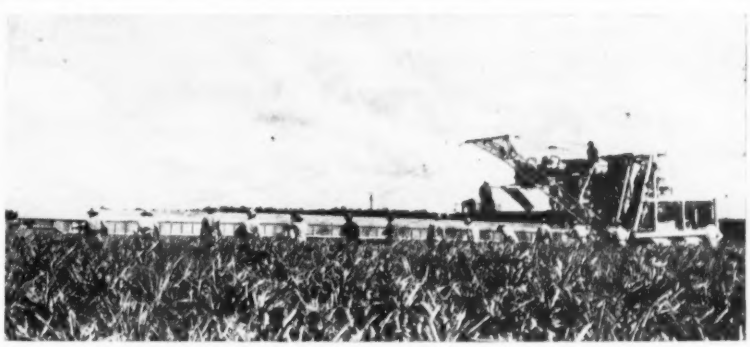
DynaTrode, electrode, creates its own arc, requires no ground and does not have to be struck upon metal. Operator has complete control at all times and determines when and where arc will start. Arc resembles flame in appearance and has characteristics of a torch flame, from 5 to 8-in. in length, temperature 8,000 deg F.

Technically, DynaTrode is a self energizing arc rod. Heavy coating, formulated to give thermo chemical inter-reaction with arc stream to react with non-metallic material, is reduced more slowly than core. This forms a crucible or tube of coating through which energy is concentrated into a fine tip and its character has been changed by disintegrating coating. Thermal ionization of coating by arc stream combined with concentration produces conditions necessary to melt refractory material.

These are properties of formulation and electrical and thermal equilibrium which produce a pre-determined thermo chemical inter-reaction between process of electrode disintegration and components of refractory material.

Conventional welding machine of 400 amp. or more capacity and a supply of DynaTrode rods are all equipment required. — *ChemcoTec Div., Eutectic Welding Alloys Corp., 40-40 172 St., Flushing, New York.*

Circle 103B on Reader Service Card



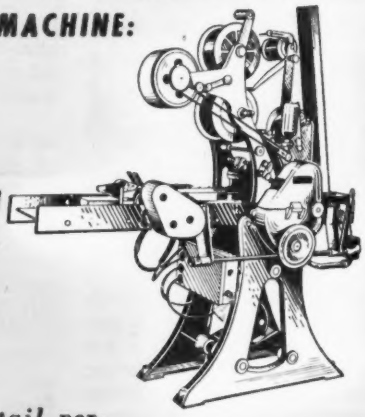
PINEAPPLES ON ALUMINUM. To speed and ease harvesting of pineapples, Libbey, McNeill & Libbey now employ a 60 ft. lightweight, 18 in. aluminum boom. Fabricator's engineers employed same principles of design as that in aircraft wing spars and came up with this 1,400 lb. semi-tension field beam. Upper and lower ribs are of extruded aluminum and web of light gage sheet. Unit was designed by—*Kaiser Aluminum and Chemical Corp., Oakland, Calif.*

Circle 103C on Reader Service Card

FROM HEADACHES

SINCE THE BAYER COMPANY DIVISION TURNED TO SCANDIA AUTOMATIC BUNDLING MACHINES

YOUR PRODUCT, TOO, DESERVES THE BENEFITS OF THE *SCANDIA* AUTOMATIC BUNDLING MACHINE:



- **VERSATILITY**
  bundles in Kraft, glassines or cellophane
- **REDUCED COSTS**
  greater production and shipping costs reduced
- **IMPROVED APPEARANCE**
  custom wrapped; permits mass displays
- **COMPACTNESS**
  machine occupies less factory space

Your inquiries concerning detail performance characteristics are invited.

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Manufacturers of Better Packaging Machinery

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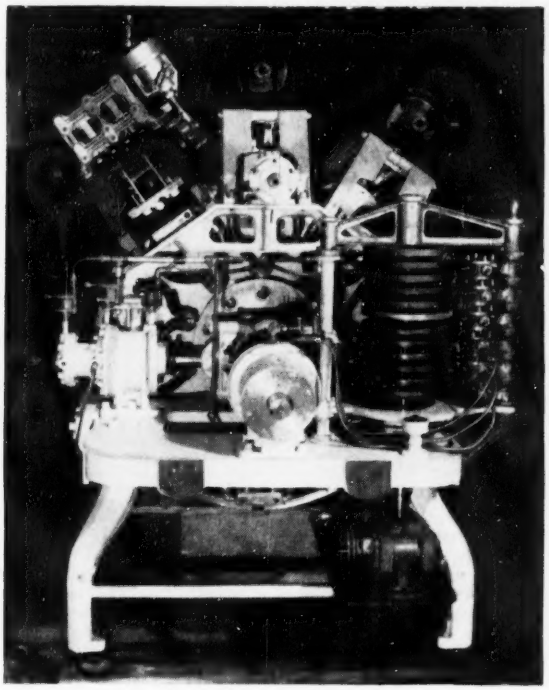
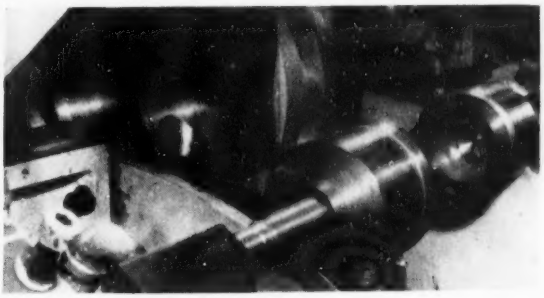
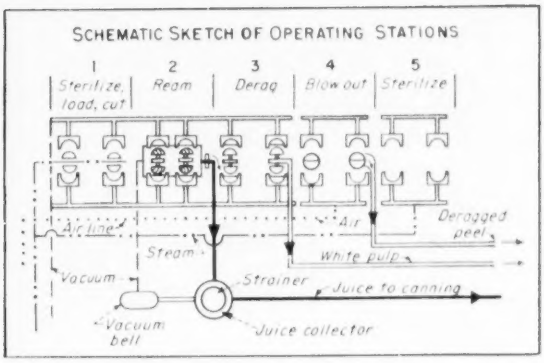
Citrus Juice Extractor Has High Output, Protects Quality







Six advantages in citrus processing are claimed with use of new juice extraction machine recently developed. They are as follows: (1) Juice is extracted under vacuum; (2) presence of peel oil and terpins in juice is prevented and/or controlled; (3) high extraction; (4) quality flavor and vitamin C content retained; (5) practical elimination of progressive oxidation changes in finished product; (6) pre-processing of citrus rind and peel for by-product salvage.

Named Lannen Process, after its inventor, H. T. Lannen, new machine (above left) occupies approximately 36 sq. ft. (6x6 ft.) of floor space. Unit is compact and is stated to be easily serviced while in operation. Because of many intermittent motions, air is prime mover. With exception of three small fractional hp. motors, one to drive extracting heads, one to operate deragging knives, and one to operate timing mechanism, entire unit is operated by air and vacuum.

Machine consists of a large metal spool suspended on a heavy cast iron frame which revolves on oversized ball-bearings. To each flange of this spool are mounted ten brackets, each supporting two stainless steel cups. These cups (above right) act as receivers for citrus fruit and are free to slide back and forth as they engage various servicing stations (see sketch) on other parts of machine. As spool revolves it intermittently engages stationary servicing stations.

In operation, it works this way: From grading and delivery mechanism, citrus fruit is channeled into cutting and loading device where it may be flash cauterized with live steam. Fruit is then engaged with a mechanical claw and transported to loading station. Here, fruit halves are aligned with vacuum from an auxiliary line introduced around outer periphery of peel.

Cups are machined in shape of a half sphere and fruit is gently made to conform with outer contour of cup. Reaming device and inner wall of cup are of same contour and since fruit is shaped to conform, it is possible to get maximum extraction without presence of peel oil.

After cups are loaded they progress to de-juicing station—a stainless steel chamber in which four specially designed reamers are rotating. Cup holding fruit moves into contact with this chamber and activates a series of valves which first evacuate air from chamber and then permit extraction under high vacuum.

As cup yields and recedes, valves are again activated, this time in reverse, breaking vacuum seal and withdrawing rind and pulp which were being held in a semi-spherical position. At next station, cup is moved into contact with a rotary knife mechanism which removes albedo (white lining) from flavedo (yellow outer rind), preparing it for further processing of byproducts. While machine is in motion, depth of travel in stations may be precision varied or altered.

Deragged rind is progressed to exhaust station where air is introduced and rind is automatically removed from cup. Emptied, cup moves to sterilization station where live steam is forced through chamber.

All operations are performed in one revolution of machine, and any steps can be eliminated if desired.

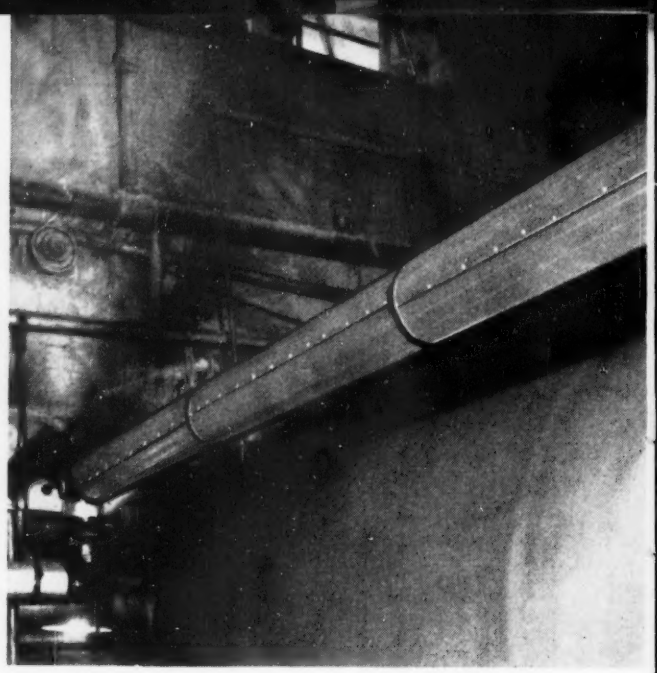
Production model is designed to process 3½- to 4 tons of fruit per hr. Activating mechanism has sufficient power to drive a second unit in tandem; doubling capacity.

Cutting and loading device is stated to be adaptable to any size of fruit from lemons through grapefruit and can handle two sizes of fruit at one loading station.

Process is covered by patent issued to Air Line Engineering Corp. Manufacturing and leasing rights on a royalty basis and negotiations for license will be handled by—*Harold W. Stewart, P. O. Box 1737, San Francisco 1.*

Circle 105A on Reader Service Card

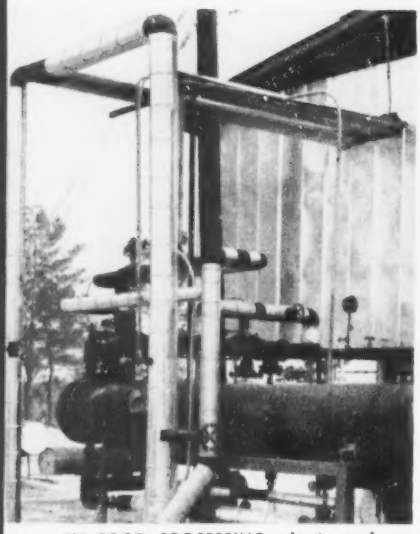
IN PETROLEUM REFINERIES like this a new kind of aluminum jacketing is used to protect the insulation on hot and cold lines. It is known as Childers Aluminum Jacketing and is especially engineered to combine the long life and weather resistance of aluminum with a low first cost. It goes on quick and easy—can be used and re-used. It is made of tough but flexible .006" 35 aluminum alloy, so it handles easily and requires no shop forming.



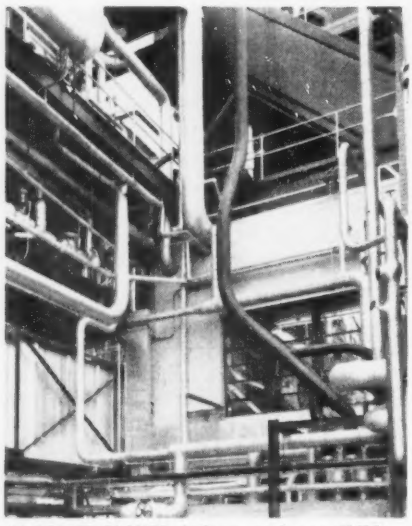
IN CHEMICAL AND PAPER plants: engineers are finding new uses for this easy-to-handle jacketing. Childers Jacketing here is in use at Scott Paper Company's tremendous Chester, Pa., plant. The insulated line passes between fast moving rolls carrying the felt used in paper making both above and below the line. The Aluminum Jacketing protects against paper dust and water, both of which are always present in the manufacture of paper. The jacketing also appreciably diminishes the possibility of the spread of fire which might strike across ordinary canvas jacketing.

Engineered for outdoor lines — new, low-cost aluminum jacketing now used in 567 processing plants

The new kind of aluminum jacketing for insulated lines shown in the pictures on this page is Childers Aluminum Weatherproof Jacketing. Write for samples and full details, no obligation. Childers Manufacturing Co., Dept. FE-1, 3620 W. 11th St., Houston 8, Texas.



IN FOOD PROCESSING plants such as this Minute Maid Corp. unit at Plymouth, Fla., Childers Jacketing is useful for both indoor and outdoor installations. Its clean, shining appearance and ease of washing are extra advantages.

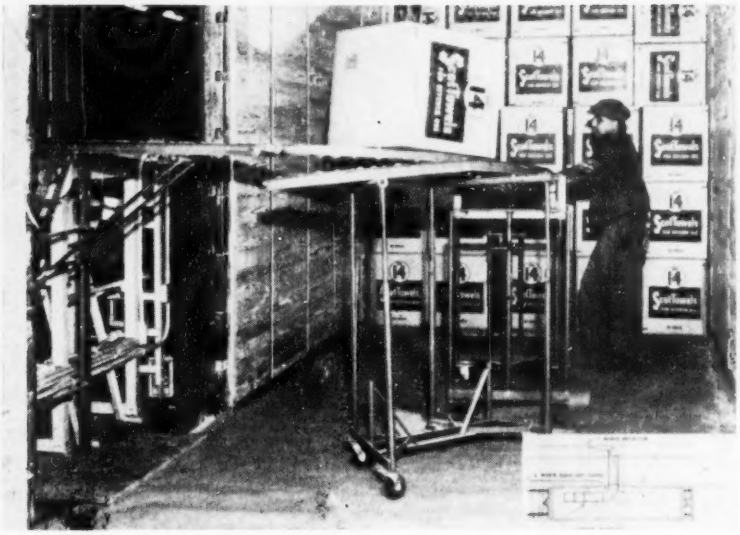


IN POWER PLANTS—indoors and out—Childers Jacketing is an ideal material for protecting insulation. This is a big outdoor installation in the South. This jacketing needs no painting, and the gleaming aluminum surface makes for "good housekeeping" in any utility or institutional power station.

ALMOST ANYWHERE you have insulated lines in your processing plant, consider this specially engineered jacketing. It is flexible, easy-to-handle; yet it has the appearance values and the weather resistance that are inherent in aluminum. Write to address shown above for full details.

Advertisement

"Flopover" Curve Speeds Car Loading



Recently developed, mobile, time-saving 90 deg. conveyor curve was designed expressly for filling or emptying freight cars.

No adjustments are required when direction is changed. Curve, a "flop-over" unit, provides flexibility and saves time normally required to reverse and position conveyors for box car loading.

Curve consists of half section pivoting on center 45 deg. axis. Wheels or rollers on half section extend above channel on both sides enabling it to function when flipped in either direction. This permits direction of flow of articles to be changed 180 deg. simply by changing position of conveyor from left to right as needed.

Unit is ruggedly built and rolls easily into position on casters. Both wheel and roller models are available. —*Wilkie Company, 5520 Arch St., Philadelphia 39.*

Circle 107A on Reader Service Card

Wieners Speedily Packaged in Cellophane

Fast, neat packaging of wieners is reported with use of new unit.

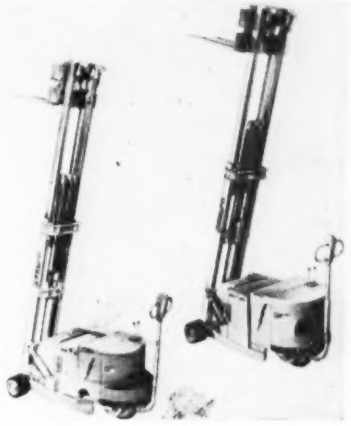
Machine consists of an air cylinder and valve, cradle for products, chute, plunger, envelope box and sealer with thermostatic control. Working parts are all plated, and surfaces of all equipment that comes in contact with product are constructed of stainless steel.

In operation, product is quickly packaged by placing cellophane bag over snout of chute and forcing wieners into bag by pressing lever that actuates plunger. Loaded bag then passes to sealer which completes job in one simple operation.

Machine is not limited to use of envelope. With modifications which have already been applied, according to maker, boxes or similar containers can be used to suit packer's requirements — *Roto-Table Co., 2605 E. Third St., Dayton 3.*

Circle 107B on Reader Service Card

Industrial Lift-Trucks Are Light, Compact



Maximum utility for operation in minimum aisles and over low capacity floors is claimed for new lightweight, compact, Powerworker industrial trucks.

New handlers, telescopic tilting fork stackers, come in four base capacities of 1,500, 2,000, 2,500, and 3,000 lb., all rated at 24 in. center line of load.

Two standard models are offered in each capacity incorporating Hi-Lo stack feature. One has an 83 in. overall height with 64 in. of free lift and maximum of 130 in. The other, especially designed for highway truck loading, has a 68 in. overall height with 49 in. free lift and a 100 in. max. Lifting speeds vary from 21 to 14 ft. per min. depending upon load.—*Clark Equipment Co., Powerworker Dept., Buchanan, Mich.*

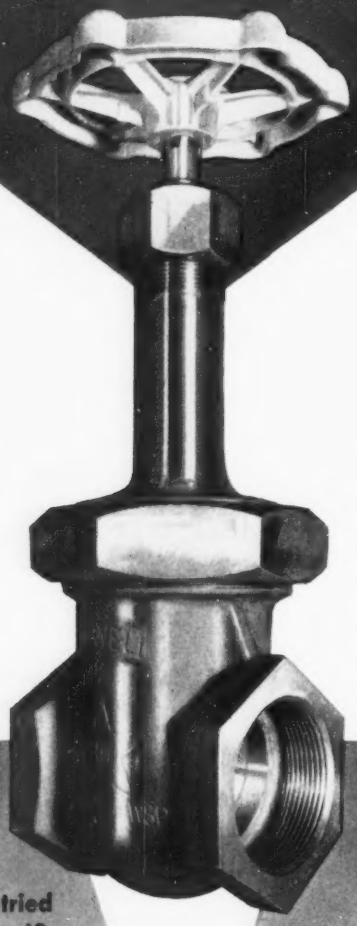
Circle 107C on Reader Service Card

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—page 157. Then sign at the bottom and mail.

For your convenience, too, items in this department are listed and keyed in the Reader Service Section.

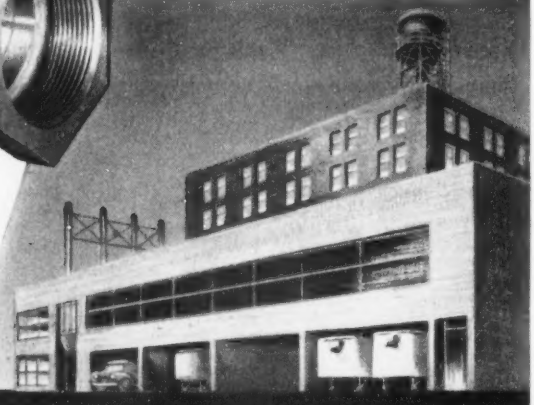
To know how good valves can be, install valves that are known to be good



DEPENDABLE VALVES SINCE 1846

If you already have Powell Valves in your lines, you are enjoying flow control at its best. But possibly you have never tried valves engineered to meet specific service conditions under which they must operate. To find out how good valves really can be, install Powell.

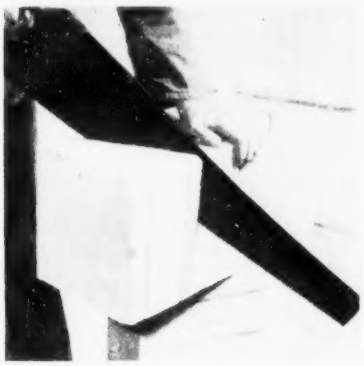
The Wm. Powell Company
Cincinnati 22, Ohio



POWELL

BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES

Lightweight, Mineral Building Material Handled Like Wood



Of interest to firms considering plant expansion is a new, versatile lightweight mineral building material called "Zeprex". It replaces concrete in building superstructures and can be sawed, drilled and nailed like wood, according to manufacturers.

Zeprex is made of siliceous material, cement and water, together with certain chemicals. Basic component is monocalcium silicate, which is stated to have a compressive strength of 20,000 psi. at density of 100 lb. per cu. ft.

It is made at densities varying from 25 to 50 lb. per cu. ft., depending on purpose for which it is needed. Most commonly used density is one-fifth weight of concrete.

Properties of material are reported as follows:

Water absorption is reported one-third as much as brick; low heat conductivity makes it ideal for thermal insulation; it is immune to termites, and is termed practically free from shrinking or swelling.

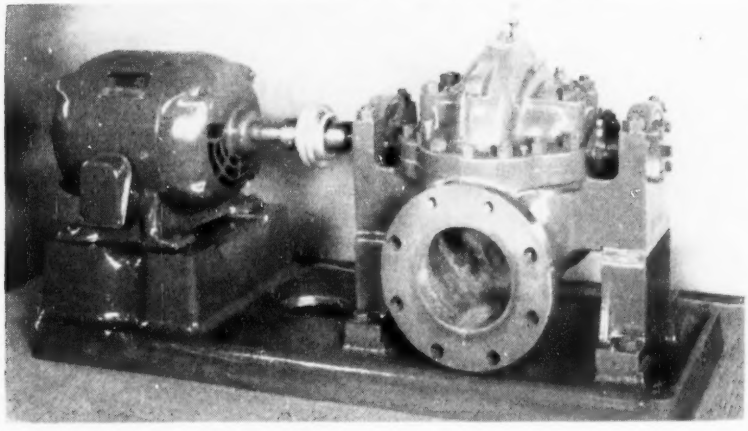
Material has been used extensively in Sweden for roofing slabs—density 30 lb. per cu ft. Roofing, usually covered with weather-resistant asphalted felt, is reported used for more than 50 percent of all industrial jobs in Sweden. Slabs are from 3 ft. to 18 ft. long, 2 to 8 in. thick and 20 in. wide. Its lightness minimizes structural steel requirements and thus provides economical roofing.

Material is also used externally for building blocks.

Material, successfully used in Sweden during past 15 yr., is now being introduced in this country by—*U.S. Plywood Corp.*, 55 W. 44th St., New York.

Circle 109A on Reader Service Card

Compactness Marks New Centrifugal Pumps



Overall savings in length of as much as 50 percent in some models are reported from new series of compact, single stage, double suction centrifugal pumps. Bearing spans kept to shortest practical distances do the trick.

Designated as Fig. 3405 pumps, standard features on all include renewable stuffing box bushings, sealed bearing housings, cowl-type glands suitable for use with quenching liquids, stainless steel impeller keys, Teflon water seal rings, die-formed stuffing box packing, and corrosion-resistant gland bolts.

Pump casings are split horizontally. Removal of upper half permits inspection, maintenance, and take-out of entire rotating element without disturbing suction and discharge piping, or pump and driver alignment.

New line has three different assemblies of shafts and rotating parts. Wide interchangeability of parts in each assembly makes it possible to provide 19 different pump sizes in the three groups. In addition, unique locking design of shaft sleeves makes it possible to change direction of impeller rotation easily in field without additional parts.

Pumps can be supplied with electric motor, belt, or steam turbine drives, if desired. Impeller is of the double-suction type providing hydraulic balance. It is cast in one piece of iron or bronze, depending on requirements. All exterior surfaces are machined, while all interior surfaces of waterways are hand finished.

Packed type stuffing boxes are standard, but mechanical seals of either single or double types can be furnished on order. Changes from the conventional stuffing box to mechanical seal, and vice versa, can be made easily in the field.

All mounting dimensions of pumps within each group are identical, giving wide ranges of interchangeability in the field, should new requirements be needed. In addition, motor drive

They loved good Maple Flavor
Long before the first Fourth of July;
Today, once you try Norda Maple,
You'll love it. Quality's why.

Did you get a chance to go to a sugar bush this Spring and taste fresh Maple Syrup, from trees tapped a few hours before?

If you did, or if you didn't, here's a test we wish you'd make. Try some Norda Maple Flavor, either genuine or concentrated imitation.

How do you like it? Isn't it good? Doesn't it taste as fresh and rich as *any* maple you ever enjoyed? Notice its color, its aroma, its true maple-sweetness, in all characteristics.

Use Norda Maple Flavor wherever quality counts and economy matters. Its full-bodied strength insures the *right* maple taste without waste. You will find it most profitable.

You are the best judge of your own needs. Send for generous free samples.

Use "A Favorite to Flavor It"
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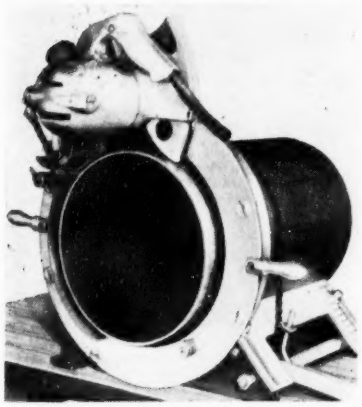
bedplates are standardized being jig-drilled and tapped to accommodate all motor frames within scope of bedplate. This facilitates change of motors in field without added expense of drilling and tapping for new motor.

Bearing housings are completely sealed against moisture and dirt, making pumps suitable for outdoor installations. Pumps have capacities ranging from 200 to 6,400 gpm., with heads up to 260—*Goulds Pumps, Inc., Seneca Falls, N. Y.*

Circle 109B on Reader Service Card

Pipe, Tubing Cut Neatly With Speedy Power Saw



Fast, accurate cutting of pipe and tubing of aluminum, copper, stainless steel and other metals in varying thickness is claimed for this new "Super-Speed," power cut-off saw.

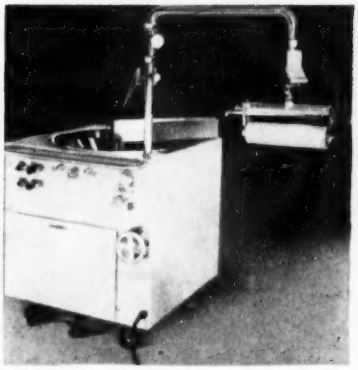
It is available in two models for cutting ½ in. tubing through 12 in. pipe. One cuts from ½ through 6 in., the other model cuts from ½ through 12 in.

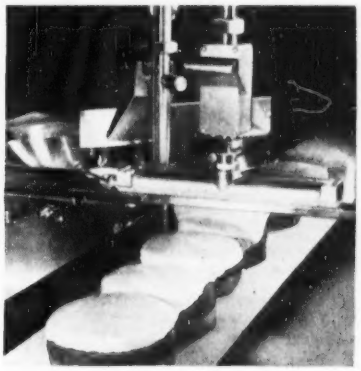
Using abrasive cutting wheels, saw cuts clearly, giving a square non-distorted surface without misalignment or burrs, and uses 110v. a.c. It is simple to operate and no extra skill or experience is needed. It has a free-moving, rotating ring which encompasses pipe or tubing being cut. Saw is attached to frame so that saw and frame rotate together. All operator does is to set saw to make cut desired and rotate saw frame, cutting around periphery of tube or pipe.

Portability and light weight make it ideal for shop use as well as "in-plant" field fabricating. Unit is easily secured to bench and quickly adjusted for size of tubing or pipe.—*Tri-Clover Machine Co., Kenosha, Wis.*

Circle 111A on Reader Service Card

Mechanical Depositor Has Wide Icing Range





Many icing and filling operations previously requiring hand work on sweet goods and cakes are reported now done mechanically by this continuous depositor.

Materials sanitary in construction and design are highlights of new mobile unit made of polished stainless steel with approved sanitary fittings. Quick-connect couplers leading to an interior system enables operator to flush machine automatically and have it clean and ready for further use in less than five minutes.

Built low to make loading easy, single open bowl permits simplified filling. Thermostatically controlled water jacket is provided with an automatic shut-off in event water drops below required level.

Motor and pump operate at wide range of speeds to provide flexibility in quantity of icing and rate of operation.

A broad variety of accessories include: A standard 12 in. depositing head with width and thickness adjustment; a 12 in. roller for simulating hand type icings; a shower distributing head for string icing and for odd shaped cakes; an 18 in. depositing head for use with a roller for running any type of baked goods using hot or flat icing without the necessity of depanning; a dual operation head for applying strings and criss cross icings or decoration simultaneously for products such as hot cross buns; an icing gun with tips to deliver variety of filling or decoration.

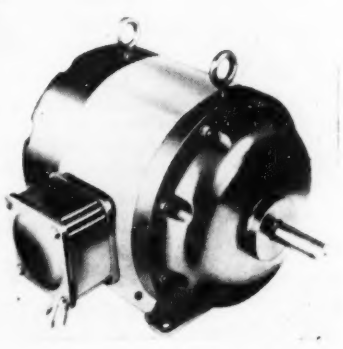
All accessories and hose for flushing fit into stainless steel accessory drawer built into unit.

Depositor uses a sanitary metering pump actuated by variable speed drive providing accurate, uniform delivery of icing or filling.

Among safety features built into depositor are: Air cooling of drive mechanisms which come into play automatically when machine is operating at high speeds; a thermal relay control with automatic reset on motor to prevent overload; on and off water tight buttons for both pump and heater mounted on front panel along with a pilot light. A bypass system makes it unnecessary to shut off machine for brief interruptions and prevents over pressuring of icing line.—*Mallet & Co., Inc., 1200 Sheffield St., Pittsburgh.*

Circle 111B on Reader Service Card

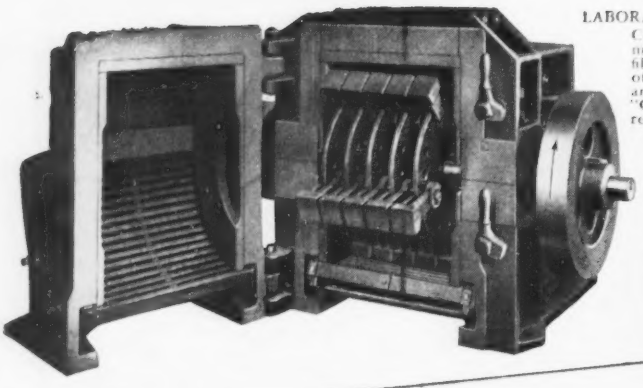
Stainless Outer Shells on Chem-Resistant Motors



On new line of chemical resistant motors recently announced, outer shells on all frames are constructed of stainless steel. Motors are available in ratings from 1 to 40 hp, in NEMA frames up to 405, in totally-enclosed and Underwriters' Approved explosion-proof construction.

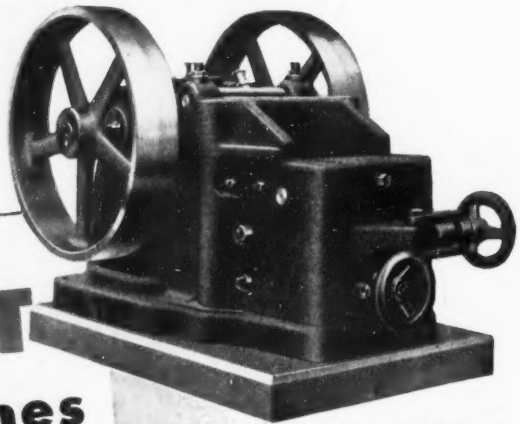
Class "A" chemical insulation treatments permit use of motors in applications involving acids, alkalis, canning and packing.

Wide variety of construction modifications is available, including a choice of cast bronze, cast aluminum,



LABORATORY SWING-SLEDGE MILLS

Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



STURTEVANT

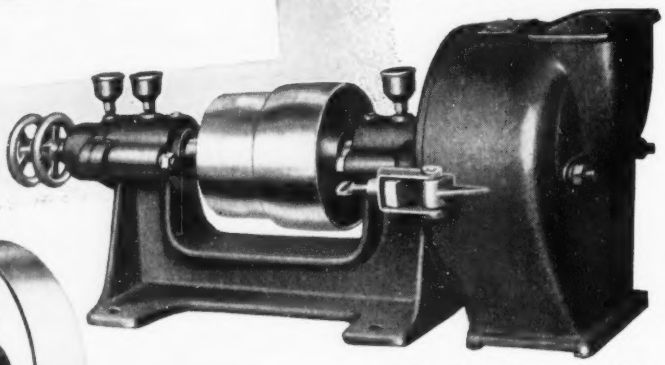
Laboratory Machines

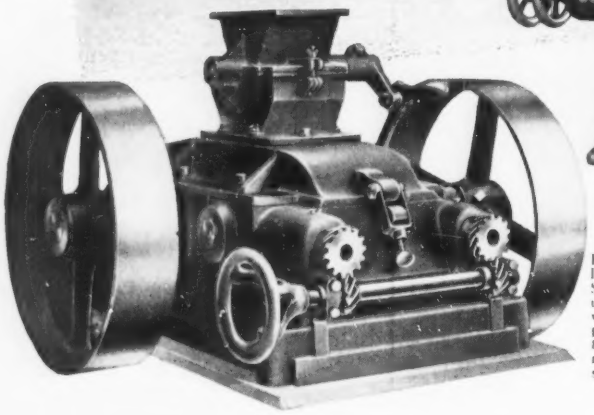
Assure Quality of Products

Fast - Economical - Accurate

LABORATORY JAW CRUSHERS

Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 or 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.





LABORATORY CRUSHING ROLLS

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the 8 x 5 size is from $\frac{1}{2}$ in. to 20 mesh — and for the 12 x 12 size from $\frac{3}{4}$ in. to 20 mesh.

LABORATORY SAMPLE GRINDER

Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

The only sure way to maintain strict quality of products is laboratory control . . . and that calls for accurate sampling.

Sturtevant Laboratory Equipment meets the exacting requirements of laboratory work. They are fast and accurate . . . provide true samples.

Rugged and dependable, Sturtevant equipment actually has all the features of full size machines plus extra accuracy and wider range of adjustment. The "Open-Door" accessibility permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples.

Investigate Sturtevant equipment for your laboratory. It will cut your sampling costs . . . help maintain strict quality of products . . . increase sales. Write for complete details and catalog.

STURTEVANT MILL COMPANY

106 CLAYTON STREET, BOSTON 22, MASS.

Designers and Manufacturers of:

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

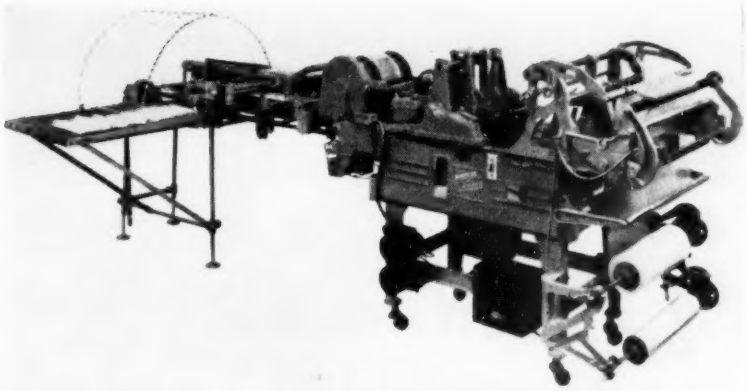
or cast iron ventilating fans. Iron, stainless steel, or flattened expanded metal ventilating grills may also be specified. Automatic drain-and-breather plugs, as well as stainless steel shafts, can be supplied if desired.

Added attention is given to protect metal parts against corrosion. Steel parts are dipped in a corrosion-resisting coating, then baked and painted. Die-cast rotor is sprayed with corrosion inhibitor.

Terminal box on totally-enclosed models is gasketed and power leads are sealed at shells with a non-hardening compound. Repellent grease at shaft extension hub keeps moisture away from bearings. These bearings, pre-lubricated and sealed on both sides, are double-row width. Sealed-in grease permits maintenance-free operation for five years or more.—*Robbins & Myers, Inc., Springfield 99, Ohio.*

Circle 111C on Reader Service Card

Device Sorts, Stacks, Counts Bags

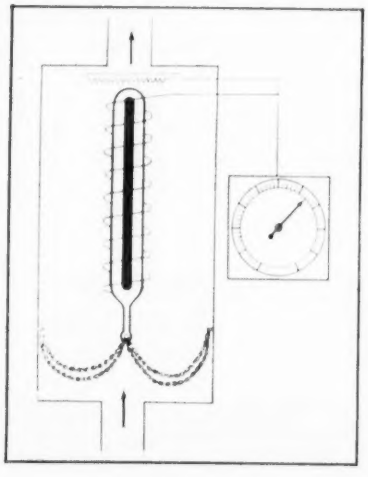


Attached to Model 4-7 bag making machine, this new device (left) stacks, counts and sorts bags. Use of new stacker-counter-sorter is reported to make it possible for one operator to supervise several machines.

Unit consists of a movable stacker and a conveyor belt on which groups of 10, 25, or 50 polyethylene bags are sorted in stacks. A metering device keeps count of individual bags as well as total number of stacked units.—*Simplex Packaging Machinery, Inc., Oakland, Calif.*

Circle 113A on Reader Service Card

Instrument Measures Density of Flowing Liquids



With use of this new instrument, density of flowing liquids, it is said, can be continuously indicated, recorded, and controlled.

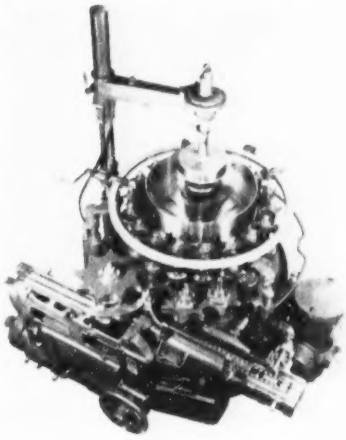
Known as Princo Densitrol, it is available in different models, most basic of which offers direct sight readings of liquid density at the pipeline point of sampling. More complex models provide continuous indication or recording of liquid density at a distance from sampling chamber itself. Other models can be installed to directly control density in such liquid processing operations as blending, mixing, proportioning, diluting or concentrating.

Density-sensitive element in unit is a totally-submerged plummet, fastened by chain of known weight to a fixed reference point (see sketch). For each density within range of this plummet-chain assembly, plummet assumes a definite equilibrium position. Any changes in position are translated through plummet core and electrical position measuring device into continuous indication, record or control of liquid density. Plummet action is without friction and is not affected by vibration.

Any calibration can be furnished (Deg. Baume, specific gravity, deg. A.P.I.) within the range limits of 0.2 to 0.005 density or equivalent full scale change within the limits 0.5 to 3.5 density. Accuracy for all ranges is plus or minus 3 percent of range or 0.0002 density, whichever is greater. Sensitivity for all ranges is plus or minus ½ percent of range.—*Precision Thermometer and Instrument Co., 1434 Brandywine St., Philadelphia 30.*

Circle 113B on Reader Service Card

Many Advantages Offered By New Vacuum Syruper



Uniformity in filling, less waste, compact high-speed lines and more rapid syrup penetration are reported with use of new machine, FMC No. 18 Pre-Vacuumizing Syruper, PVS.

When used in conjunction with vacuum closer, usually steam flow type, PVS eliminates conventional exhaust-box and gravity syruper combination with resultant savings in floor space and exhausting steam requirements.

As a can enters syruper from filler, it is positioned under a valve where a suction action removes air from can, liberating air that may be trapped within cavities and pockets of food product. Upon completion of this pre-vacuumizing function, syrup from supply tank of machine is admitted to

"We're adding 22 new Dodge trucks to our fleet!"

. . . says **R. H. PRICE,** *Treasurer, Certified Grocers of California, Ltd., Los Angeles, California*

"We're making our fleet 100% Dodge, because our frozen-food trucks must be completely dependable! Our present Dodge trucks make as high as forty-five starts and stops per day—constantly fighting heavy traffic—which is the hardest kind of strain. Yet, our Dodges stick to it, day in and day out—with less repairs, less gas, oil, tires and depreciation than any other trucks we've used!

"And with the larger new Dodge engines and greater carrying capacities, we're certain our new Dodge trucks will make our operation even more economical and dependable than before!"

Why new DODGE *"Job-Rated"* TRUCKS are more economical than ever!

"Job-Rated" POWER SAVES YOU MONEY!

Only Dodge offers seven engines . . . 3 brand-new . . . from 100 to 171 h.p. Thus you get the *right* engine for the job; an engine that delivers maximum performance and long-range dependability with *minimum upkeep!* Dodge engines have hosts of features that assure longer life at far less cost: floating oil intakes, full-pressure lubrication systems, exhaust valve seat inserts, two fuel filters and chrome-plated top rings. In addition, 4-ring aluminum-alloy pistons and higher compression ratios help bring oil and gas expense right down to earth!

BIGGER PAYLOADS FOR GREATER INCOME!

Dodge trucks now haul bigger payloads than ever, with some Gross Combination Weights increased by as much as 5,000 pounds! And Dodge is still the most maneuverable truck you can buy. Wide front treads and shorter wheelbases cut "Jockeying" time and speed deliveries. For extra safety, new Dodge dual-primary rear brakes give smoother, sure stops with less pedal pressure. So talk it over with your friendly Dodge dealer. He's making real money-saving deals these days!

DODGE

"Job-Rated" TRUCKS

For more information, use coupon on page 159.

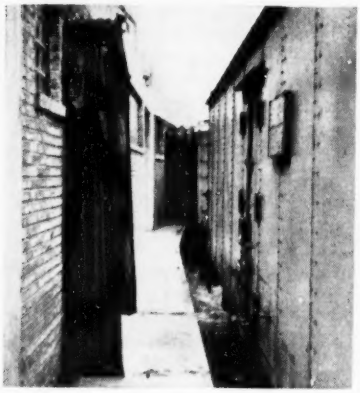
can and a final vacuumizing is introduced to remove residual air while can is being filled to a definite head space. Can is then vented to atmosphere and ejected from syruper.

Speed of machine ranges up to 275 cpm., depending on can size. It can be built to handle can sizes from 211 to 404 in dia. by 300 to 704 in height. A "no-can, no-fill" device is furnished on unit, and a vacuum and trap tank is provided to reclaim any syrup pulled over in vacuum line. An evacuator pump serves to retrieve syrup from trap tank and return it to supply tank.

Valve assembly is so designed so that plates can be quickly removed for cleaning or replacing.—*Food Machinery and Chemical Corp., San Jose 6, Calif.*

Circle 113C on Reader Service Card

Loading Dock Shelters Up Efficiency, Safety



Increased labor efficiency in loading and unloading of cars and trucks is reported with use of folding shelters that provide protection against the weather for both men and materials, keep dock boards dry, speeding up operations and promoting safety.

Called "Loading Dock Shelters," they are being mass produced in several standard models to fit typical conditions. Units are constructed of rugged canvas covers which extend outward on collapsible steel framework to shelter truck or freight car doors of any size. When not in use they are folded back into position flush against the building.

Canvas walls are durable and sturdy. Flexibility of curtains permits them to be rolled up or drawn aside quickly and easily to allow free flow of traffic and ventilation in hot weather.—*Atlas Products Co., 1300 W. Washington Blvd., Chicago 7.*

Circle 115A on Reader Service Card

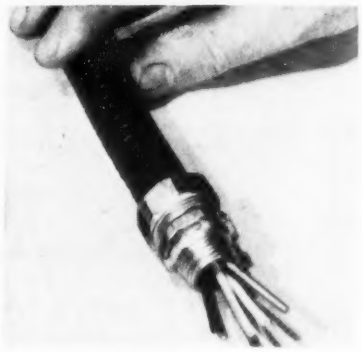
Air-Operated Switch Speeds Dispatching

Time, space and effort are saved with use of air-operated switch section to dispatch heavy packages to any one of several diverting lines.

Push-button controlled unit can be conveniently located to direct flow of one or more packages in accordance with wishes of operator. It is available in various sizes and styles to meet requirements of specific jobs.—*Alvey Conveyor Manufacturing Co., 9313 Olive Street Rd., St. Louis 24.*

Circle 115B on Reader Service Card

New Electrical Conduit Is Tough, Water-Tight



For use in wet locations is new liquid-tight flexible electrical conduit.

Known as Sealtite Type UA, its tough, extruded synthetic covering over metal core is said to protect wiring against moisture, oil, dirt, chemicals, and corrosive fumes—on permanent or temporary installations. Conduit is made of spirally wound, interlocked zinc-plated steel strip with a copper bonding conductor wound spirally in space between each convolution on inside of conduit.

Light and flexible, it can be cut to required lengths—bends easily. Underwriters' approved fittings for use with conduit are readily available. Where space is cramped and hard to get at, conduit is easy to install. Applications of conduit are suggested to overcome problems of movement, vibration, misalignment—both indoors and outdoors.

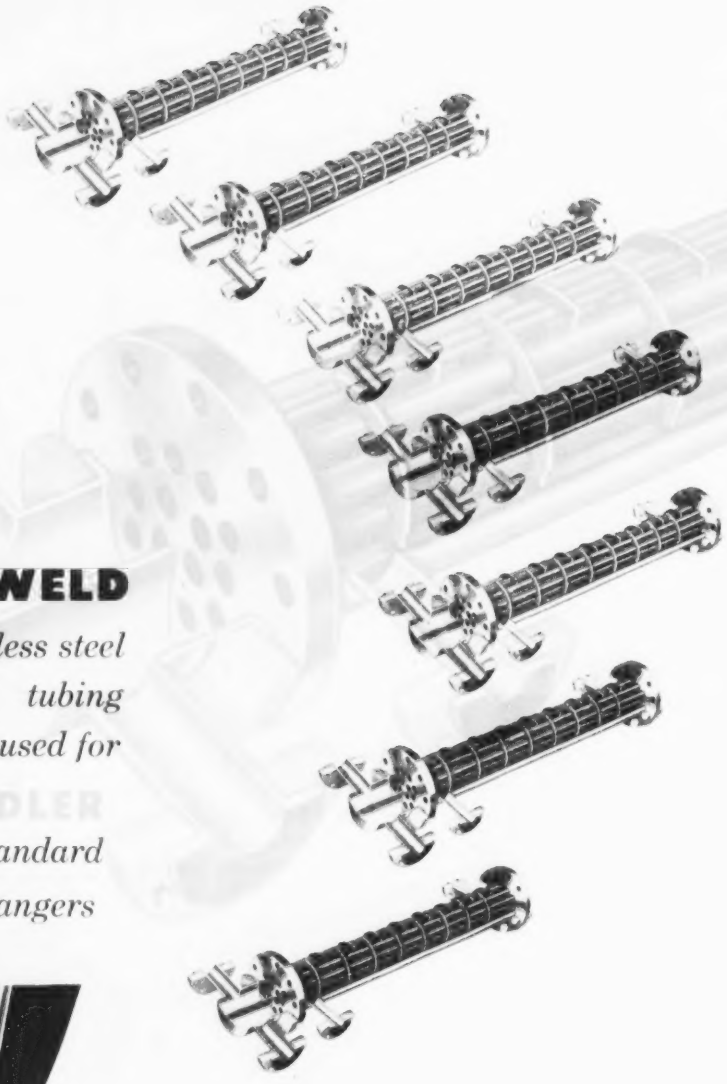
Type UA is available in long lengths in nominal electrical ID. sizes ⅜ to 1¼ in. inclusive.—*American Brass Co., American Metal Hose Branch, Waterbury 20, Conn.*

Circle 115C on Reader Service Card

Miniature Transmitters Are Highly Sensitive

Readings of temperature, pressure, vacuum, differential pressure, and liquid level to recording, indicating, and controlling receivers can be measured and transmitted by this miniature pneumatic transmitter. Transmission is by means of air pressures of between 3 and 15 psi. that have a direct relation to measured quantity.

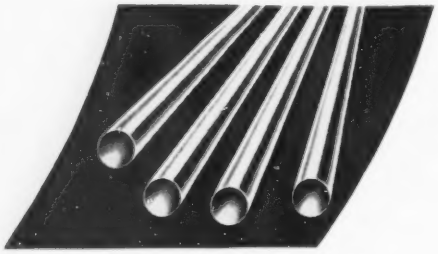
Known as Series 650, unit uses standard measuring elements and a simple transmitting mechanism with only one pivot and no flexures. Friction and lost motion are thereby eliminated for all practical purposes. Transmitter is sensitive to extremely small changes in measured value, as little as



TRENTWELD

stainless steel tubing used for

flexible standard heat exchangers



Prompt deliveries of virtually custom built stainless steel heat exchangers are now available at competitive standard costs through the Pfaudler Company's system of flexible standards. Under this plan you may select the most applicable combination of length and diameter for a given heat transfer area. And nozzles may be selected for any size and in any position, either threaded or flanged.

To meet Pfaudler's varied and exacting requirements for high quality stainless steel tubing, Trentweld is used. For Trentweld Stainless Steel Tubing is made by tube specialists who roll and weld stainless and high alloy tubing, exclusively.

You're sure to find a TRENTWELD tubing that will meet your needs. It's available in sizes from $\frac{1}{8}$" to 40" OD, and in a wide range of grades, gauges and finishes. Our engineers have had broad experience in solving tubing problems in many different industries. So if you have a problem involving stainless or high alloy tubing, write to us today and let us help you solve it.

TRENTWELD

STAINLESS STEEL TUBING

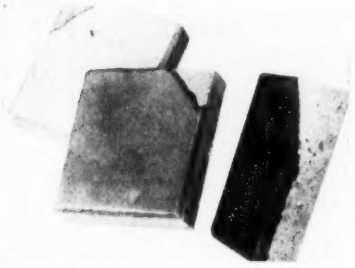
TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

0.03 percent of range, including reversal. High-speed transmission and excellent control result from use of a pneumatic relay.

Transmitter weighs 7½ lb., is weatherproof, can be installed in any location and will operate in any position. —*Bristol Co., Waterbury 20, Conn.*

Circle 115D on Reader Service Card

Resin Floor-Surfacer Resists Corrosion



A new trowelled-on material is claimed to cure into a hard, dense corrosion proof surface that will withstand trucking, foot traffic and abrasion. Rated load carrying strength is stated about four times greater than dense concrete.

Material, known as Ceilcrete, is a combination of synthetic liquid resin, inert fillers and pigments. Greatest usefulness is application to walls and floors subject to corrosive liquids or atmospheres. According to maker, it resists solvents, acids, and alkalis, is non-sparking, non-slip, and has high impact strength.

Material is usually applied in a single layer ¼ in. thick. Small amount required adds very little extra weight to floors nor does it appreciably change elevation. Material is available in black and colors.—*Ceilcote Co., 4832 Ridge Road, Cleveland 9.*

Circle 117A on Reader Service Card

Riveted Roller-Chain Is Quickly Changed

Machine down-time due to chain failure and replacement is minimized with an improved, easy-to-assemble riveted roller type units.

New chain combines long-wearing characteristics of riveted type with the ease of assembly and disassembly of cottered type.

Basically, chain is supplied in ASA standard and heavy series, 1 in. through 2½ in. pitch sizes in multiple widths. It is made up in 10 ft. lengths of riveted chain, having a single pin coupler installed at convenient intervals. Spacing of couplers varies, depending on chain size, but they are placed in assembled chain so that any length can be made up without cutting rivets or damaging parts.

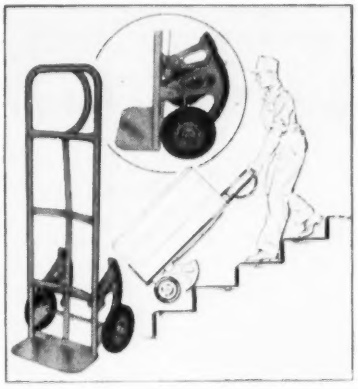
Unique but simple is coupler link which makes this possible. A single removable pin, disconnects chain, center links or spacer plates and cannot move or fall out when disconnecting chain. One end of single-pin coupler-link is firmly riveted to adjacent link. Other end contains the single coupler pin.

One end of this pin is spun over a washer, and other has a milled flat and locking pin hole. Pin is an easy fit throughout chain except for the milled flat end, which is press-fitted into matching hole of coupler link plate. Thus, it is only necessary to drive pin the length of its milled flat in assembly or disassembly. It is easy to remove, yet press fit and locking pin on one end and the washer on other assure a good tight fit overall for maximum chain life.

Each 10 ft. section of chain is boxed individually, and any even pitch length of chain from 2 pitches up to 10 ft. can be made from one box of chain. Odd pitch lentghs can be obtained by using a 3-pitch riveted offset section. Lengths greater than 10 ft. are made by combining additional sections.—*Baldwin-Duckworth, Div. of Chain Belt Co., Springfield 2, Mass.*

Circle 117B on Reader Service Card

Two Wheel Hand Truck Eases Climbing Tasks



Moving a load up or down stairs, curbs, and multi-level passageways is eased with use of this two wheel utility hand truck.

Called E-Z-Climb, its two aluminum rocker shoes act like an extra pair of wheels in keeping the load supported until the wheels reach next level. At this point wheels engage new level and complete cycle is repeated until final elevation is reached. Cycle is some for traveling either direction, up or down.

After each operation rocker arms return to their neutral position by being permanently located on a spring loaded double-action axle. This device keeps load on a constant line for friction-free travel rather than incur drag or sliding friction. This feature decreases amount of energy required to transport a load upgrade. Thus, operator fatigue, is reduced.

Trucks are available with both steel and aluminum frames in a variety of wheel diameters featuring both semi-pneumatic and pneumatic tires. Trucks equipped with climber weigh but 4 lb. more than standard trucks.—*Automatic Bending Co., Harvey, Ill.*

Cicle 117C on Reader Service Card

Sanitary Pump Assembly Is Light, Saves Space

Compactness marks new line of Sanitor pump assemblies for transferring milk from farm cooler tanks to tank trucks.

Compact drive with motor mounted above pump conserves space in truck compartment. Weight of unit is stated to be 100 lb. less than conventional equipment.

Pumps are made in solid dairy metal and meet 3A specifications. They can be turned in supporting bracket in 45 deg. angle increments to change suction and discharge ports for any handy arrangement. Pump can be pulled from bracket for cleaning.

Capacities of units include 10,200, 17,850 and 25,500 lb. of milk per hour with respective Models No. J178, K178 and KK178.—*Viking Pump Co., Cedar Falls, Iowa.*

Circle 117D on Reader Service Card

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In Behalf of Progress . . .

Industry Plans More Business—More Competition

Plans for industrial expansion and modernization are on the bright side. They are, that is, in respect to maintenance of high-level business activity and consumer buying power.

But from where you sit as food company management, they may or may not be bright. Depends upon whether your competitors plan the bigger and the better things.

Business men plan to increase manufacturing capacity 7 percent this year, and by another 9 percent by 1956. And they expect sales to rise 10 percent by '56, according to the findings of McGraw-Hill's sixth annual survey of business plans for new plants and equipment.

From these all-industry plans, you can detect optimism for the future, as well as a level of capital expenditure which in itself is an economic prop.

With that general industrial background, plus the plans of the food manufacturing industry, you have the yardsticks with which to measure the adequacy of your own estimates and plans for the future. And here's what a cross section of progressive food companies see in the cards:

Sales Increase—Food companies expect their individual sales to rise by 14 percent by 1956, and sales for the industry as a whole to go up 10 percent. You see here two things. Expected increase parallels that anticipated for all industry. And the progressive companies expect to do 4 percent better than the average.

Increase in Capacity—Taking 1939 as a base of 100, food manufacturing capacity hit an index of 157 last year, will go to 163 this year, and to 178 by 1956. Percentagewise, capacity is up 4 percent for 1953 and will increase another 9 percent by '56.

Expansion vs. Modernization—Last year, 28 percent of capital expenditures in the food industry went for expansion, 72 percent for modernization. This year the figures are 45 and 55. For 1954-56, only 17 percent is for expansion and 83 percent for modernization.

Obviously, higher efficiency is the thing uppermost in the minds of most food companies. That points to stiffer price and quality competition.

Capital Expenditures—In 1952, the industry spent $785 million for new plant and equipment, according to Department of Commerce figures. Planned for this year, our survey reveals, is an expenditure of $879 million. For 1954-56, preliminary plans place the spending range between a $440 million minimum and a $1,011 million maximum, annually.

New and improved processes and methods are the incentive for capital expenditures by many food companies. Several canners, for example, are looking to high-temperature short-time sterilization.

It is the expenditures for the cost-cutting, quality-enhancing equipment that puts the point of sharp significance on modernization money in the hands of your competitors.

Never has there been a time when more productivity-boosting equipment was available.

Never has there been a time when the quick-payoff potential of capital expenditure was greater.

Never has there been a time when you had so much to lose from progress in the other fellow's plant.

Enticing More Technical Brains Into Food Field

What can be done to increase the number of technically trained people available to the food processing and allied industries?

It's a good question—and one which needs answering quickly.

And Continental Can Co. may well have the answer. This firm recently sponsored a dinner and science career symposium for 150 high school science teachers in Chicago. At this symposium, company executives and outside speakers pointed up the problem and outlined the opportunities for young technical people in the food and packaging fields.

Here are a few of the significant facts brought to the attention of the teachers:

1. There will be a demand for 30,000 to 50,000 engineers in 1954. But only about 15,000 will be graduated.

2. Of the 320 people in Continental's research division, 222 are college graduates. And about one-third of these are local high school students who later entered college. Many now are district chiefs or division managers of customer research.

3. Continental needs more chemists, food engineers, mechanical engineers, physicists, and bacteriologists. But they are hard to get because of the shortage of such students today in the universities.

After being educated to the situation, the teachers were asked to be constantly on the alert for the inquisitive, patient, logical mind for science and engineering training.

If in each sizable town in the country at least one food or allied firm would follow Continental's lead, this serious problem would be well on the way to long-range solution.

PACKAGE'S NEW Thrifty Labeler

All who have seen the new THRIFTY Labeler in our plant have marvelled at its versatility and ease of operation. It will label a remarkably wide range of containers — from a gallon jug to a 4-ounce bottle. Change-over is made in a matter of minutes.

Has a speed of up to 120 a minute. And containers may enter the machine wet or dry, hot or cold, without impairing the appearance of the label.

Its unique method of applying *flexible pressure* to the label eliminates glue failures and permits labeling on recessed surfaces or odd-shaped containers. Thermoplastic or hot-melt adhesive may be used merely by equipping the glue pot with heaters.

Easily installed on existing filling and capping lines. Automatic code dating available.

Low initial cost and high operating efficiency make the new THRIFTY Labeler worthy of your serious consideration.

Write today for full particulars

PACKAGE MACHINERY COMPANY • Springfield, Massachusetts

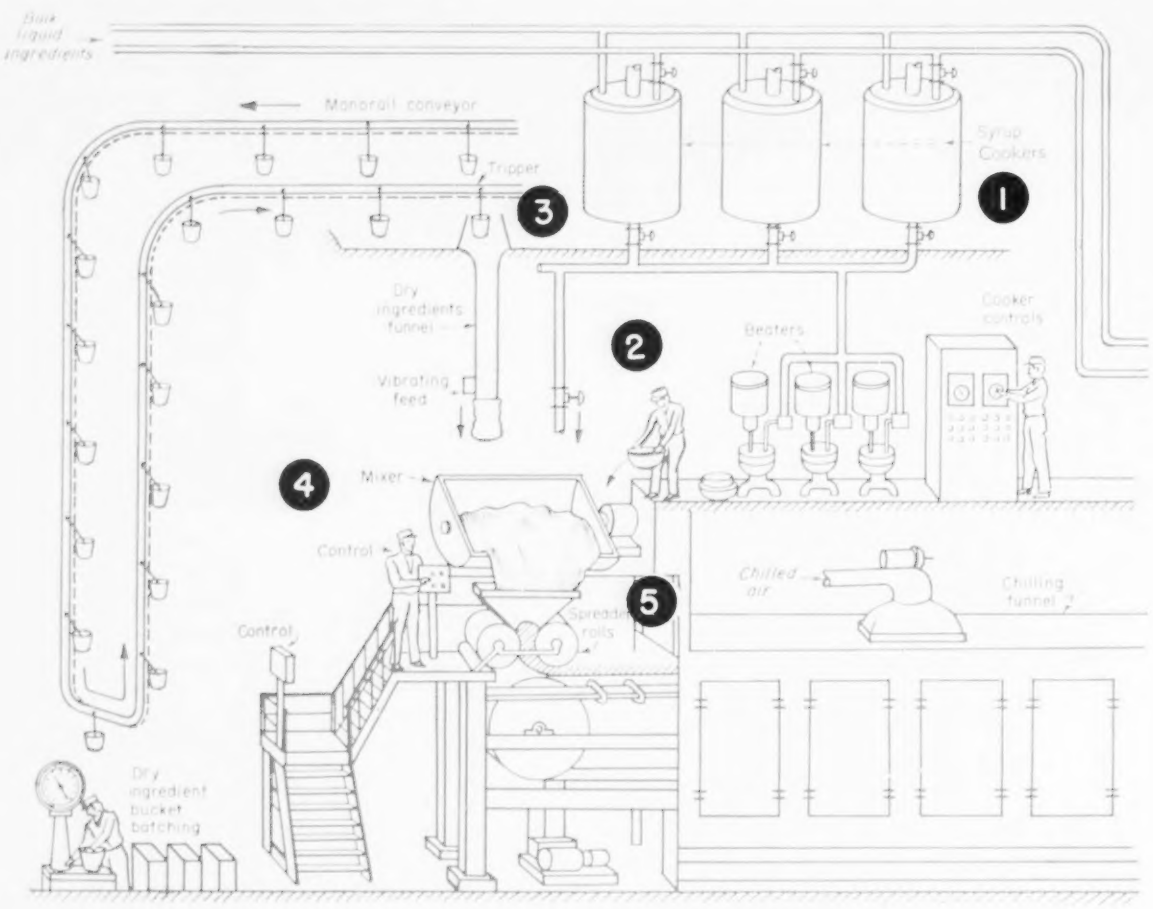
NEW YORK CHICAGO BOSTON CLEVELAND ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

PACKAGE MACHINERY COMPANY

TURN PAGE FOR FOLDOUT FLOWSHEET →

Belt-Line Candy Bar Production

Revolutionary Process Continuously Forms, Cuts at High Speed



MECHANIZED CANDY MAKING has reached a pinnacle at Mars Inc.'s Chicago plant, and this flow-sheet offers a scale portrait of one of the company's five precedent-shattering lines with stem-to-stern realism.

Corn syrup and liquid sugar, piped to the cookroom from bulk make-up and storage tanks, initially route to a series of jacketed 1,200 lb.-capacity stainless cookers that concentrate the basic heavy syrup–Point (1). Three of these cookers serve each production line, and their sequencing–plus automatic charging, cooking, and discharging–is handled from a master control panel on the floor below.

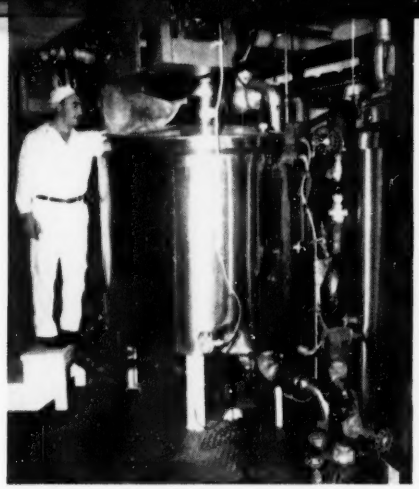
Eight batch beaters–Point (2)–supply each line. From an overhead pipe manifold, syrup is added, as needed, to the beater kettle through a timer-controlled, meter-type shut-off valve, and pure egg white is added by weight. Finished kettles are moved to the mixing process nearby.

Dry ingredients, such as salt, cocoa, malted milk, etc., are weighed out from bulk-storage bins in a make-up area into stainless steel buckets which hook into a monorail conveying system that takes them over funnels supplying the mixers.

An ingenious system of selector arms or "flags" on the buckets plus tripping microswitches above the mixer funnels makes the "metered" addition of dry ingredients fully automatic–Point (3). A man at the mixer simply presses buttons according to the formula and buckets are selectively up-ended into the funnel.

Two modified dough mixers serve the start of each line. About 350 lb. of beater mix is added and dry ingredients chuted in from the bin below each funnel by means of a

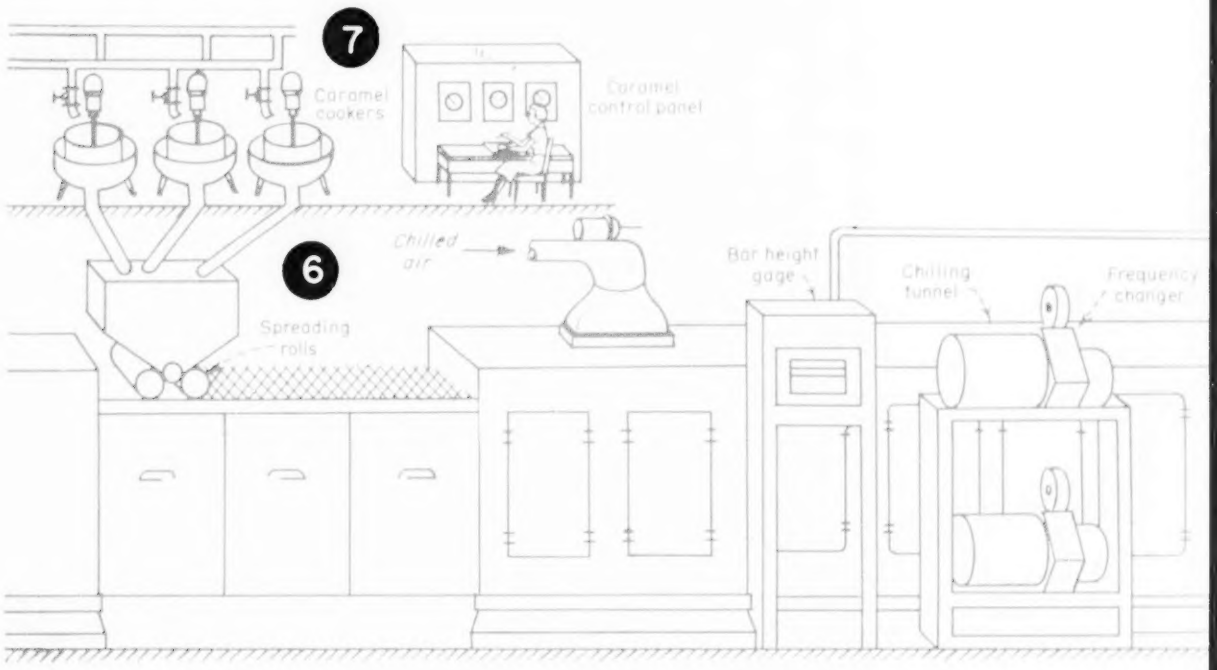
STORY BEHIND THE LINE **The extraordinary, completely new approach to candy making pictured here was the result of bold planning and visionary engineering. How knotty design problems were solved, with automation employed to free the line from human error, is revealingly told in this month's feature—"Mars Revolutionizes Process." You'll find it on page 37.**



1 SYRUP COOKERS are completely robotized with air-operated inlet-and-outlet valves, level probes. Thermocouples check each controller.

2 SYRUP BEATERS are automatically pipe-fed and timed. Then finished batches are slid to mixer. Rear panel controls battery of cookers (on floor above) in related action as indicated in our diagram.

3 DRY I
ets by
selector
automatic



vibrating feed–Point 4–controlled from the stair landing.

Vegetable oil is also added during the timed mixing through pipeline and a pre-set shut-off flowmeter. Also, candy trimmings from an adjacent radiant-heated box are used to seed the mix.

After mixing, the warm and plastic nougat pours from the tilting mixer into a feed hopper serving the brine-chilled spreader rolls at the start of the endless-belt line. Product is thus deposited in a 23¾ in.-wide sheet on the 150 ft.-long endless Swedish-steel belt–Point (5). A vegetable oil coating on belt and rolls prevents sticking.

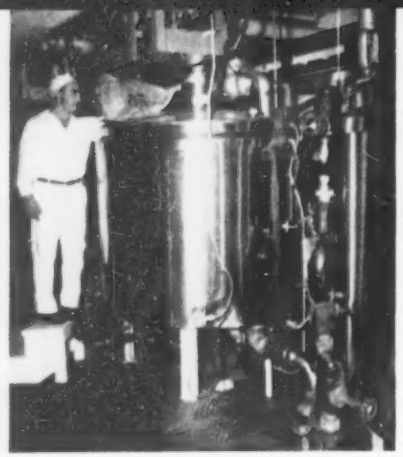
Directly after spreading, the belt-borne product passes through a high-velocity chilled-air cooling tunnel that hardens the sheet enough to permit overlay of another layer of warm candy, such as caramel or fondant. This second layer is applied via overhead hopper and spreading slits–Point (6)–with provision for nuts if desired.

Candy for the overlayer is cooked in a series of jacketed kettles on the floor area above the belt, and three units supply each line hopper through bottom discharge chutes. These cookers have an automatic cooking-cycle control–Point (7).

Leaving the endless steel belt, the sheet of candy is slit into 18 continuous strips–Points (8) and (9)–which pass, via a two level V-belt conveyor, under the reciprocating and vibrating blades of a mobile knife assembly. A special mechanical system permits the cutting while the strips pass between variable-length belt conveyors.

A belt speed-up system spaces the bars onto a Neoprene conveyor that carries the product continuously through a standard chocolate enrober–Point (10). Coating is supplied through pipe from a series of jacketed melting-and-tempering kettles located in the melting room.

Coated bars then pass through a multi-level cooling tunnel that hardens them sufficiently for an overwrap type packaging–Point (11). Eight packaging stations flank the conveyor, and overwrap and cartoning operations are performed opposite each other–Point (12)–to permit transverse movement of the wrapped bars. Full cartons are then sped off on an overhead belt system.



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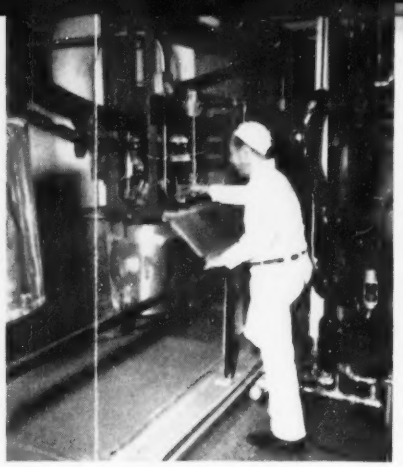
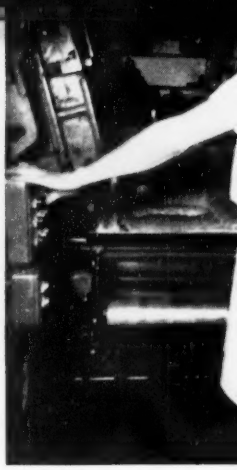
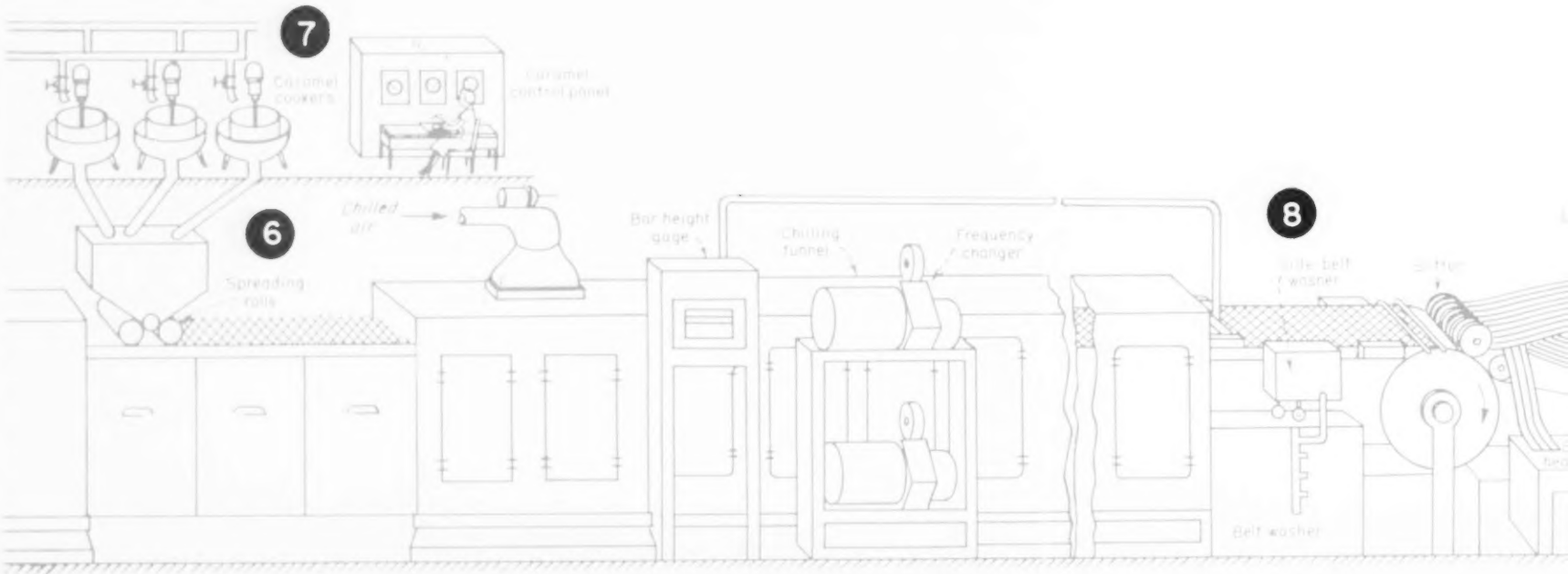


3 DRY INGREDIENTS are moved in buckets by monorail. "Flags" on handle engage selector switches to dump exact formula automatically.



4 MIXER TILTS to dis hopper serving chille Latter are oil coated by hopper).



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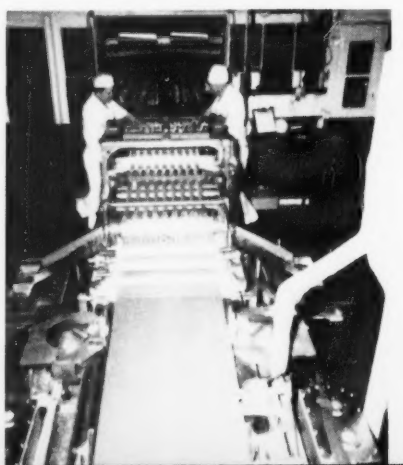
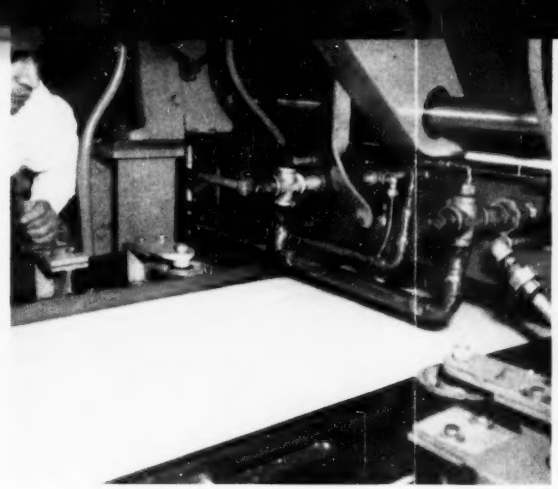
8 COOLED SHEET of candy leaves belt to be slit into 18 strips. Side trimmings chute into heated receptacles ("bin heater" in diagram) on each side.

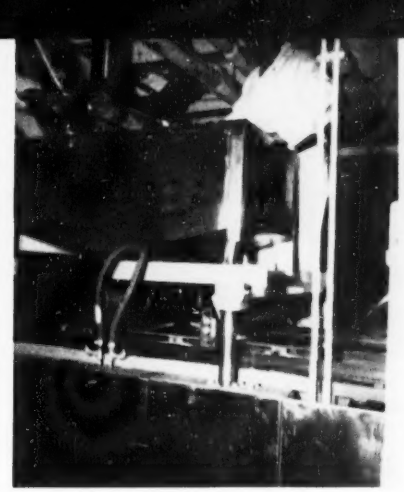


9 SLIT CANDY eating knife ants' arm contro juster.

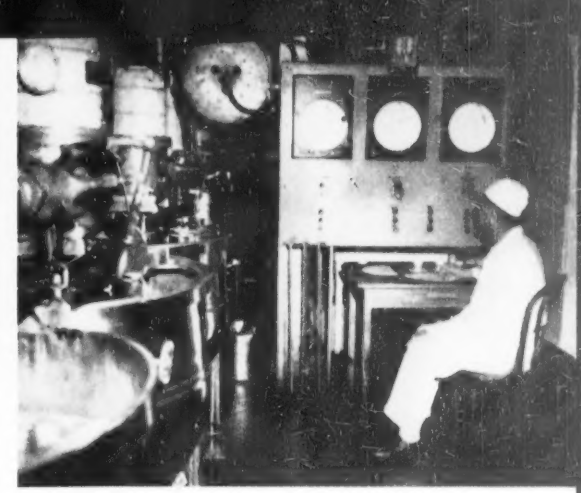
to discharge batch into chilled spreader rolls. ted by small roll (under



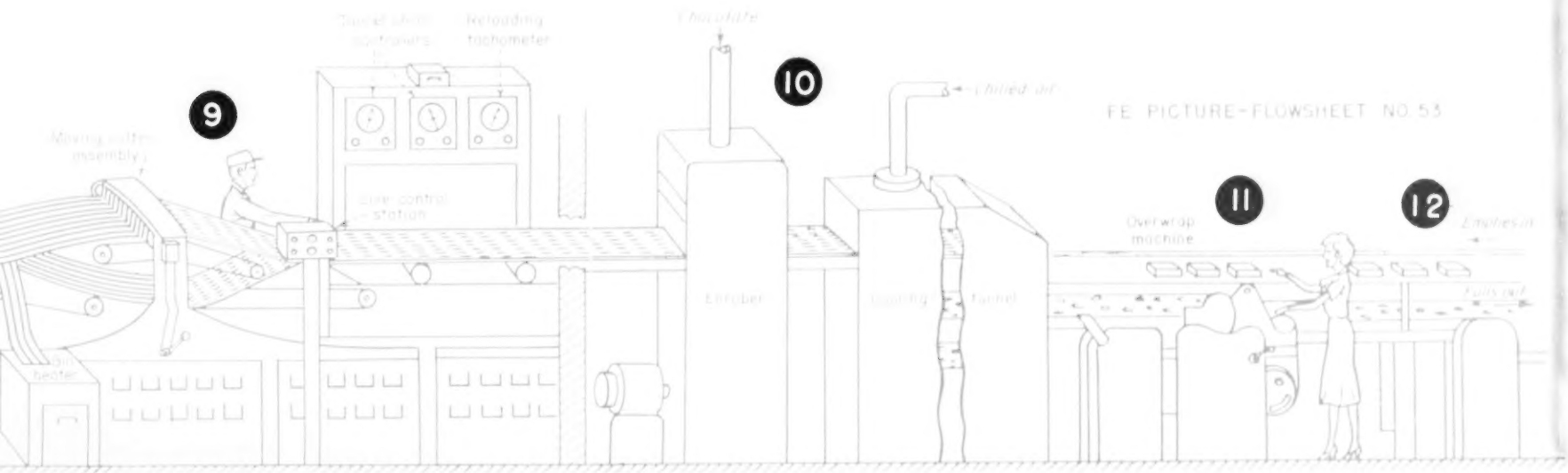
5 **CANDY SHEET** is spread out on endless belt to measure to a width of 23¼ in. Fabricated of Swedish steel, the belt extends 150 ft. Also note steel band side-belt that borders the nougat.



6 **SECOND LAYER** is applied by this vertically movable hopper, chute-fed from above. Normally, no operator is at this station.



7 **CARAMEL COOKERS** are completely sequenced and controlled from this master panel. The three jacketed kettles that are seen on the left supply one line.

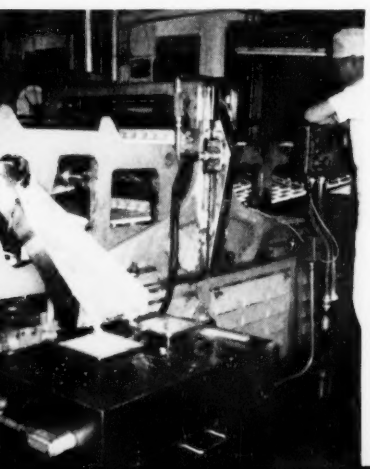


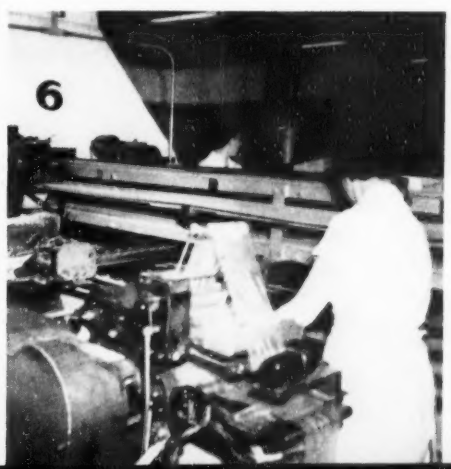
CANDY travels in two levels to recipro- knife (seen center). Panel under attend- controls line speed through frequency ad-

10 **BARS TRAVEL** from cutter through a standard chocolate enrober. The latter is fed tempered chocolate from battery of kettles in the melting room.

11 **FROM COOLING TUNNEL,** bars move down the belt and into high-speed over-wrap machines to pass transversely across to the cartoning station.

12 **EIGHT PACKAGING STATIONS** are kept hopping by the company's fast-moving production line. Belt system speeds cartons to and from operations.





the

"coming thing"

in intermediate-capacity

cooling has already arrived!

Marley Double-Flow Aquatower

Just one year ago, Marley introduced the Double-Flow Aquatower, a totally new concept in intermediate-capacity water cooling, to the air conditioning and refrigeration industry.

Trade acceptance was immediate. Engineers and contractors quickly recognized that the new towers offered every advantage of Marley patented Cross-Flow cooling, while retaining the operational simplicity of Marley's smaller Aquatowers. Everyone — architect, engineer, contractor, and food processor — heartily approved the new design that reduced usual tower height up to 66%.

Today Double-Flow Aquatowers are in service throughout the food processing industry — in packing and quick freezing plants, brewing and bottling plants, dairies, and many other installations that require 50 or more tons of refrigeration. Readily available in a complete range of sizes, in all steel or wood with asbestos cement board casing, the Double-Flow Aquatower is the modern answer to your intermediate-capacity cooling problems.

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NATURAL DRAFT TOWERS
CONVENTIONAL TOWERS

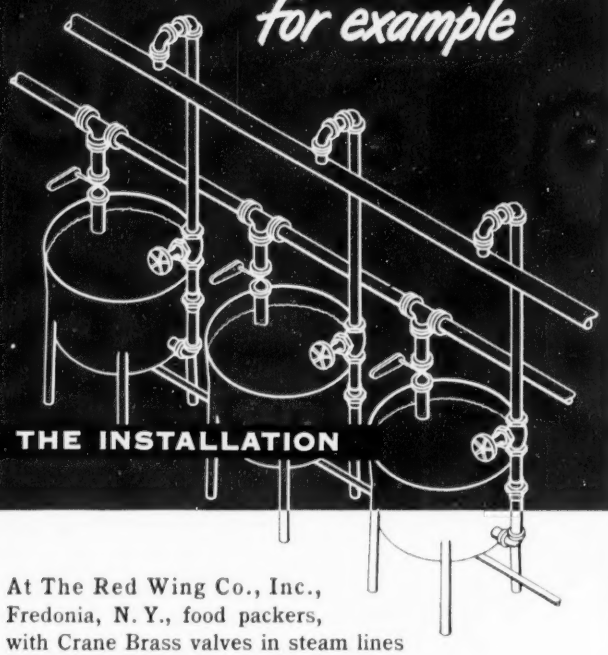
MARLEY

The Marley Company

Kansas City, Missouri

For more information, use coupon on page 159.

How Better Quality Valves Pay Off ...on Steam Throttling, for example



THE INSTALLATION

At The Red Wing Co., Inc., Fredonia, N. Y., food packers, with Crane Brass valves in steam lines to juice heaters and cooking kettles.

VALVE SERVICE RATINGS

SUITABILITY: None better for throttling

MAINTENANCE COST: No expense here

SERVICE LIFE: No sign of wearing out after 4 years

OPERATING RESULTS: Precise control of steam to cookers

PRICE: Bigger value than any other valve used

AVAILABILITY: Regular Crane Catalog Item - No. 212P

THE CASE HISTORY

At least once a week there was valve trouble in the cooking room. Leaky valves . . . disc and seat cut out . . . steam to kettles out of control.

New valves made little difference; none could stand the severe steam throttling. Not until Crane plug-type disc valves were installed.

Immediately the valve trouble stopped as did the cooking interruptions. Not even the plant operator believed it possible. In use now more than 4 years with no maintenance cost, the Crane No. 212P valves are still in like-new condition. They show no erosion, no leakage; and they operate freely.

THE VALVE

Designed expressly for severe throttling service, these Crane brass valves have plug type disc and seat of Crane Nitri-Hard stainless steel. Seating surfaces are practically impregnable to damage by cutting, erosion, etc. Disc taper permits close flow regulation. For any kind of throttling look into these valves for 150, 200, and 300-pound steam services. Your Crane Catalog or your Crane Representative will give you all facts.

THE BETTER QUALITY...BIGGER VALUE LINE...IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For more information, use coupon on page 159.

Suppose we put the Dempster-Dumpster System right down in your plant . . . then what?

● *Well First—let's make it clear that we are furnishing you with several sizes of different designs of 26 containers to suit your materials requirements. Then bear in mind that we are delivering you only one truck-mounted Dempster-Dumpster and with your driver this one outfit picks-up, hauls and dumps all containers, about like the one shown above.*

Now, how many conventional trucks are you using for handling rubbish, scrap, raw materials, and what have you?

For several years now, one plant has been doing considerably more work with two Dempster-Dumpsters and two men than they did with five trucks and fifteen men before the Dempster-Dumpster System was installed. You can guess at the approximate savings annually.

A glance at the picture below and you get the whole story of the Dempster-Dumpster System. Never before have you been able to cut bulk materials handling costs so drastically.

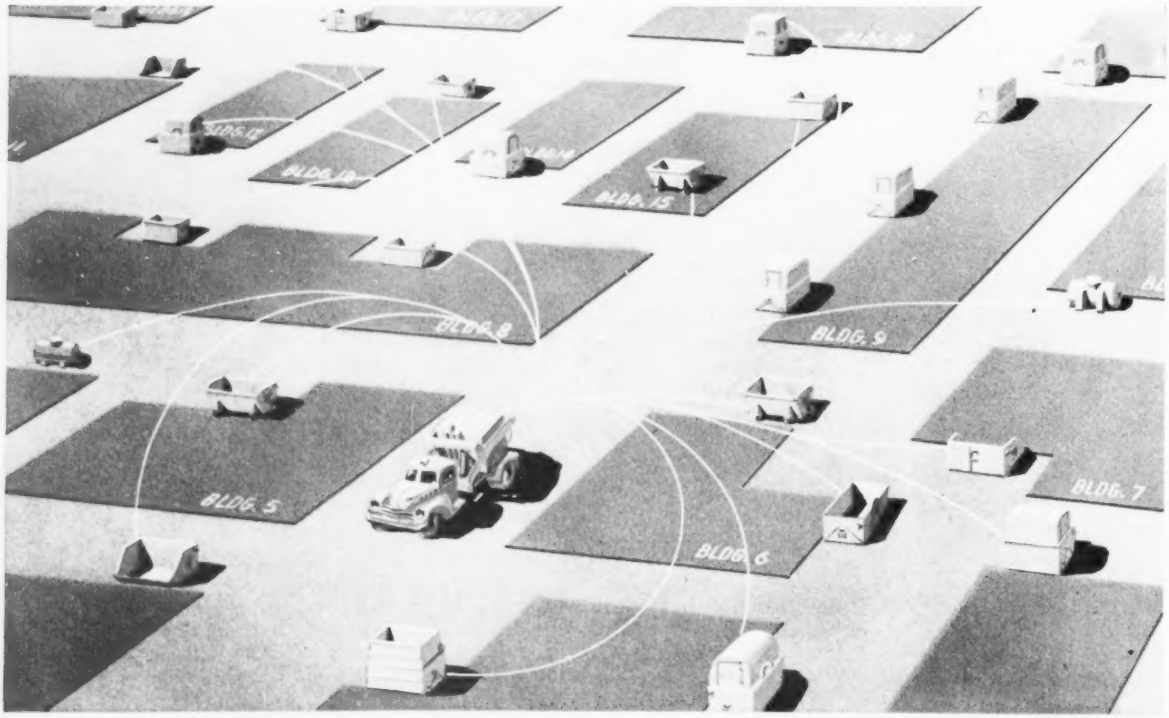
One truck mounted Dempster-Dumpster handles the entire group of 26 Dempster-Dumpster containers. These big, detachable steel containers are like having 26 truck bodies for a single truck.

Any required number of Dempster-Dumpster containers are spotted at convenient materials accumulation points inside and outside your buildings. They range in sizes up to 12 cu. yds.—3 to 4 times the capacity of a regular dump truck. Materials—bulky, light, heavy, solids, rubbish and even liquids—are dumped or placed into these containers.

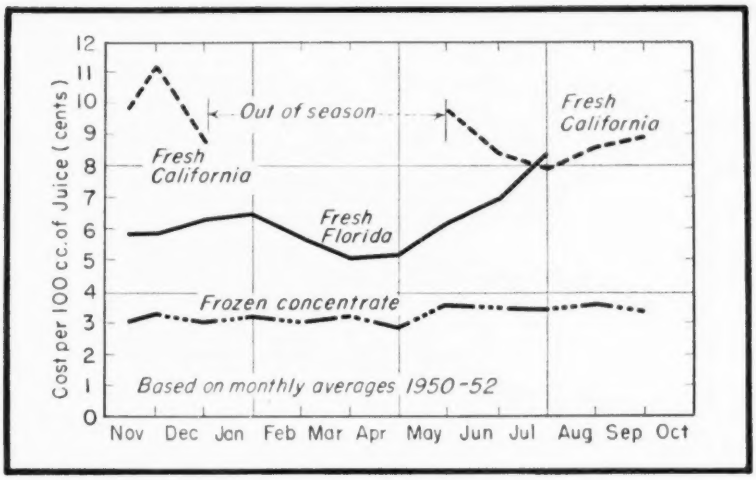
The truck mounted Dempster-Dumpster makes scheduled rounds, picks up each preloaded container, carries it to the point of disposal, sets it down intact or dumps the materials and returns the container for refilling. The entire operation is hydraulically controlled and handled by your truck driver.

It's as simple as we have described it. The amazing thing is the tremendous savings being made by the Dempster-Dumpster System in hundreds of leading industrial plants over the nation.

A product of Dempster Brothers, Inc.



DEMPSTER BROTHERS, 753 Shea Bldg., Knoxville 17, Tennessee.


Cost per 100 cc. of Juice (cents)
Out of season
Fresh California
Fresh California
Fresh Florida
Frozen concentrate
Based on monthly averages 1950-52
Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct

BIG DIFFERENCE: In New York, frozen orange juice costs half to third as much as fresh juice from Florida and California fruit.

How Good Is Frozen OJ?

Much cheaper in NYC, rates well in vitamin C and peel oil. But loses taste test to freshly squeezed juice

MATILDA D. ZINN and RUTH R. BIEN
Good Housekeeping Bureau, New York

How frozen concentrated orange juice compares with fresh juice in cost, taste preference, vitamin content, and other important factors has been determined in a 2-yr. study by Good Housekeeping Bureau. Based on N.Y.C. prices, the concentrates cost consumers about half as much as fresh juice from Florida oranges, and one-third as much as that from California fruit. Chart on this page portrays this advantage. Other charts reveal:

1. That the vitamin C levels of the frozen concentrate are nutritionally comparable to those of fresh juices.

2. That peel-oil content is low and quite uniform in the concentrates, while varying widely for fresh juice, depending upon the method of squeezing the fruit.

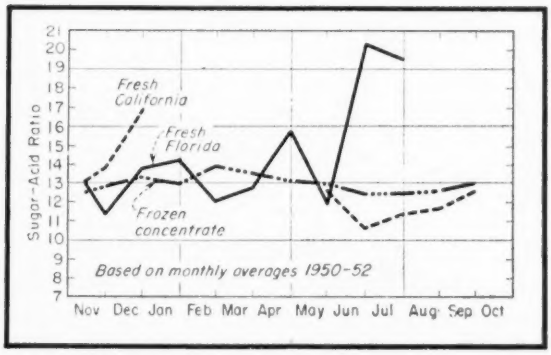
But here's a significant fact not shown in the charts: The tasting panel consistently preferred the flavor of the fresh juices, both as to character and strength of flavor.

In these taste tests, there was strong correlation between the samples rated most tart and those rated low on sugar-acid ratio. Tasters rating on sweetness correlated with Brix determinations.

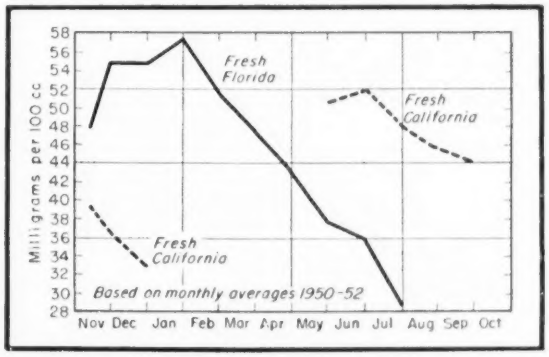
Here are other significant data from the extensive study.

YIELD—Average yield per dozen of Florida juice oranges was 1,114 cc.,

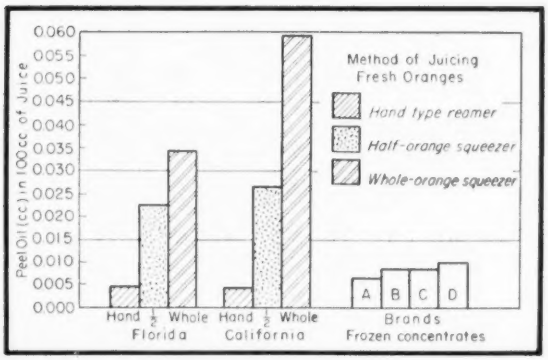
(Turn to page 190)


Sugar-Acid Ratio
Fresh California
Fresh Florida
Frozen concentrate
Based on monthly averages 1950-52
Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct

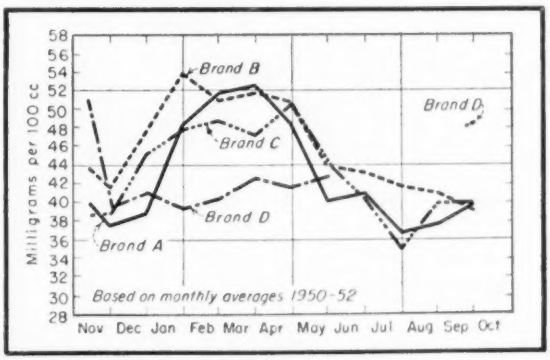
SUGAR-ACID RATIO is uniform for concentrate, but not for fresh juice. Optimum, 12 to 17


Milligrams per 100 cc
Fresh Florida
Fresh California
Fresh California
Based on monthly averages 1950-52
Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct

VITAMIN C in fresh juice varies widely with seasons, in both Florida and California oranges.



PEEL OIL is low in concentrate, but is affected in fresh juice by method of squeezing.



VITAMIN C in frozen concentrate reflects ascorbic acid curve for fresh juice 2 or 3 months later.

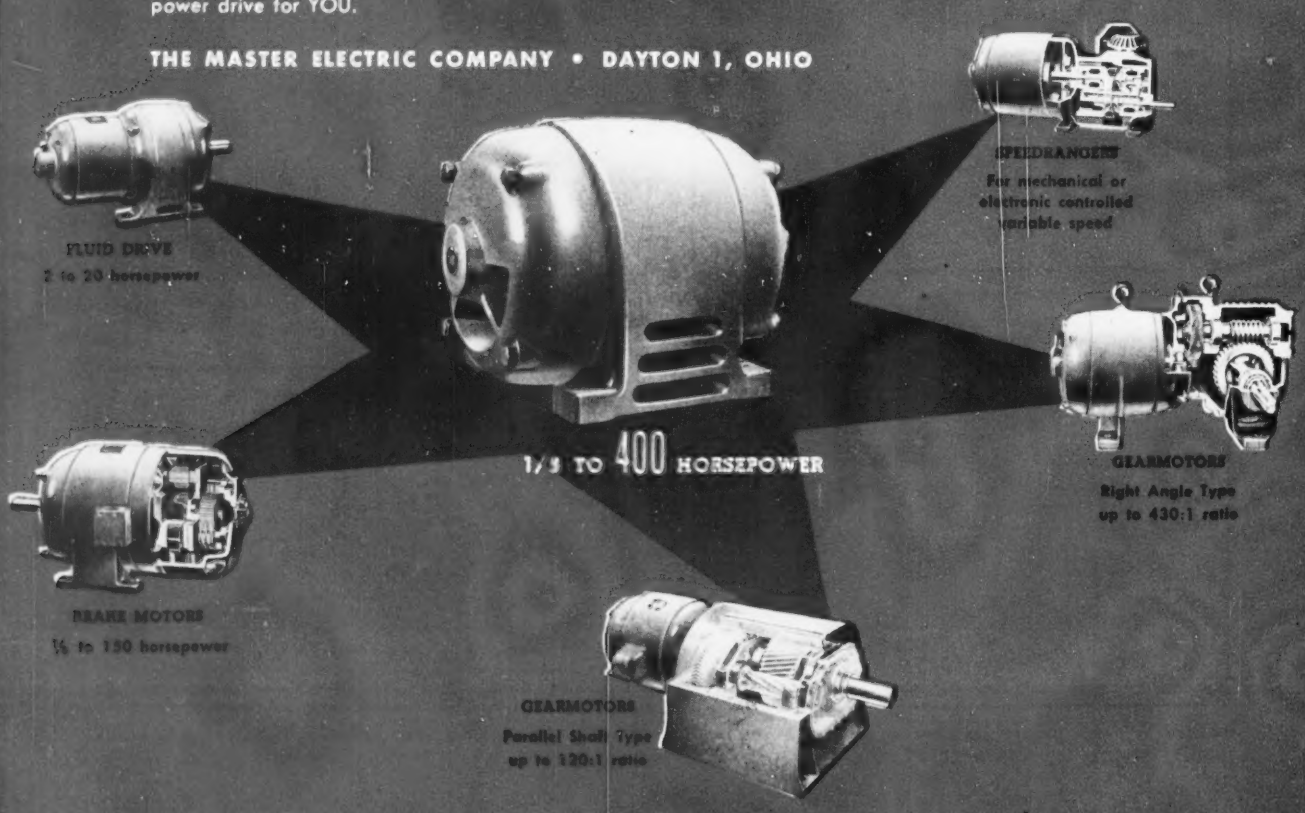
Whenever you select a power unit, don't put a straight-jacket on your ideas . . . consider ALL of the possibilities of modern power drives.

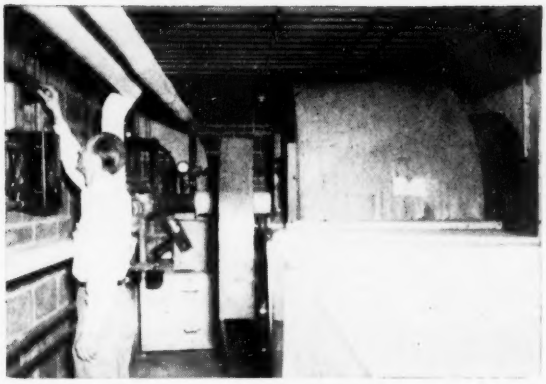
For example consider the many useful combinations that can be secured with the basic Master power units shown below. They're designed so they can be easily combined together to give you the RIGHT horsepower, the RIGHT shaft speed, the RIGHT features in one compact unit that you can use RIGHT where you want it. Nowhere else will you find power units that are so flexible, so easily adaptable, and in such a wide range of types and ratings.

Master power drives are available in thousands and thousands of ratings (⅛ to 400 HP) . . . in open, enclosed, splash proof, fan cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 430 to 1 ratio . . . with electric brakes . . . with fluid-drive . . . with mechanical or electronic variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best power drive for YOU.

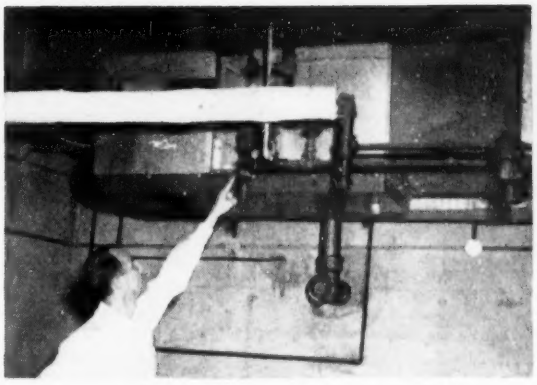
give your brains a chance

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO





MAIN AIR INTAKE (right background) is served by 6-ft. fan that delivers filtered, fresh air through distributor duct (right). Operator adjusts wall rheostat to proportion fresh and recirculated air to small unit conditioner (left of fan) that serves office area below.



IN THIS unit supplying air to the laboratory and area on floor above, temperature control is through steam regulation by air-actuated valve (indicated by operator). Just to left behind pipe is pneumatic damper device that determines amount of fresh air going to system.

Optimum Cheesemaking Assured by Air Units

Unit air filtration and heating stations provide pure, controlled atmospheres in vital working areas of modern Wisconsin plant . . . System cuts mold contamination, aids uniformity, needs little care

TRUMAN TORGERSON
General Manager, Lake to Lake Dairy Cooperative, Kiel, Wis.

Despite use of the most advanced equipment and techniques, cheesemaking can fall far short of being a predictable and routine science if the needs of proper environmental air are neglected.

Even the most obvious aspects of air—its temperature and humidity—are often overlooked by the cheesemaker. Fluctuating temperatures can greatly upset setting time and vat uniformity. And high humidity causes condensation on walls and ceilings, encouraging unwanted mold growth.

But the most overlooked angle undeniably is air's role as a "carrier"—and airborne contamination is probably the greatest scourge of the cheese processor.

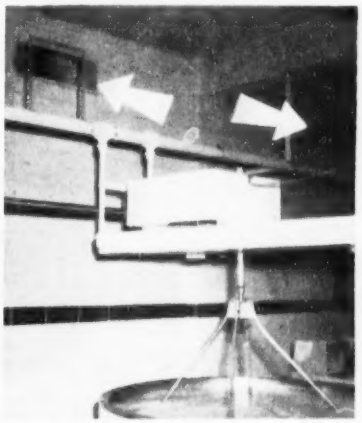
When our new Lake to Lake Dairy Cooperative plant at Kiel, Wis., was on the drawing boards a few years ago, these considerations plagued us. But the expense of complete air conditioning did not appear justifiable in view of our predominantly cool climate.

We put our minds to the problem, and answer was to install a system of forced air circulation, with unit filters, heaters, and controlled recirculation in vital processing and packaging areas. This system has proved completely effective, bringing the following gains:

- **It has eliminated moisture condensation and "sweating" throughout the plant.**
- **Reduced airborne contamination to a negligible factor.**
- **Afforded uniform, optimum air temperatures for sensitive operations.**

In our layout, we settled on six separate conditioning units as a minimum for flexible control of varying plant operations. One of these was to serve the relatively small starter rooms, where a high inside room pressure was deemed necessary to keep out possible airborne phage from outside locations. Two units were to serve the Grade A and Grade B process areas, respectively. And unit conditions were also installed for the laboratory, packaging room, and office area.

To achieve satisfactory forced-air circulation, the plant had to be designed essentially draft-tight to keep efficiency of the air intake and exhaust system high and to avoid contamination. And the capacity of our main intake fan had to be such that an internal pressure slightly in excess of external atmospheric would be maintained—this being necessary to assure that all exhausted air is completely replaced by clean air.



OUTLETS are at fixed intervals high on wall of processing area (arrows). Note absence of dust stains on adjacent ceiling and wall.

Out of the Way

Air filters and ductwork are bulky affairs, so all unit conditioners were located either aloft in a special corridor above the main hallway or in the basement directly below the areas served. The main air intake was set up at the front-end of the upper corridor—away from dust and fumes of the boiler plant stack, and in a position that minimized ductwork for distribution.

In the actual installation, a 7x7-ft. metal air filter lies directly in line with the main air intake. And providing suction, right after this filter,

(*Turn to page 137*)

UNMATCHED DEPENDABILITY

THANKS TO BATTERY POWER!

You can always depend on battery-powered industrial trucks to work all day without letdown. They have fewer moving parts, fewer friction surfaces to cause downtime . . . have in-service records that can't be matched! In addition they are fool-proof, handle, lift and maneuver faster, run silent and fume-free. Keep them moving with *dependable* Gould battery power.

Visit us at the National Materials Handling Exposition, Convention Hall, Philadelphia, Booths 335-337.

Specify
THE GOULD "THIRTY"—
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GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

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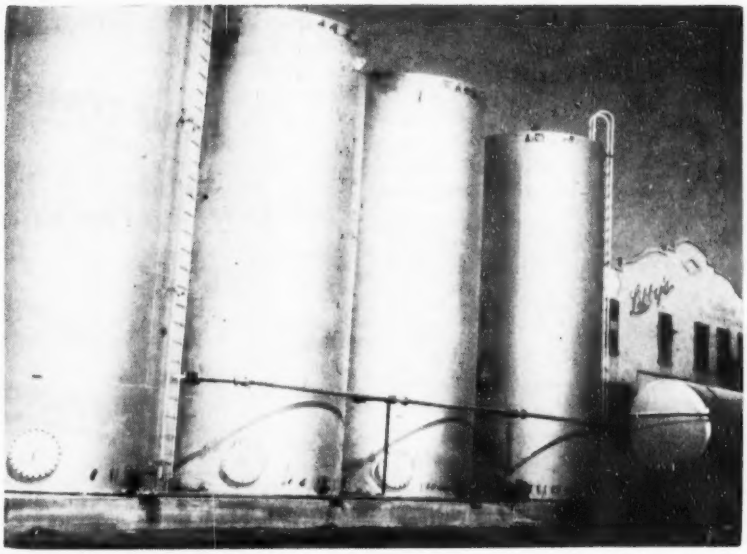
Wide check confirms excellent flavor, texture, color and appearance of these frozen packs. Sweetener-handling costs are reduced. And processings steps are reported materially simplified and accelerated



TANK-CAR SHIPMENTS of corn and liquid syrups are received for storage in these 25,000 gal.-capacity tanks at Libby's Gridley, Calif., plant. Syrups are then metered for blending and pumped for filling frozen fruit packs.

Quality Fruits *With* Corn Syrup

ERNEST H. WIEGAND
Consulting Food Technologist, Corvallis, Ore.

Use of a blend of liquid sugar and corn syrup has made a significant impact on procedures in the frozen fruit field. This blend, employed as a packing medium, has made possible better, and less costly, products.

Adaptability of corn syrups to frozen fruits has been demonstrated by many investigators. Specifically, tests have shown that corn syrup-packed frozen fruits are brighter in color, plump, firm, and sheeny.

At Food & Drug Standards hearings, it was brought out that corn syrup is of definite value to the food industry. Numerous witnesses, testifying to the satisfactory flavor, color, firmness, and texture of fruits packed with blends of sucrose and corn syrups, confirmed the favorable findings of packers who had installed blending systems in their canneries and freezing plants.

Modern methods and equipment, including pumps, meters, sterilizing lamps, and heaters (for heavier syrups), have eliminated guesswork from storing and blending operations. In addition, sanitation has been simplified.

Employment of corn syrups has benefited frozen fruit packers many ways: It has reduced handling costs[1]. For in-plant handling of sweeteners in liquid form is simpler, and thus fruit-processing is sped. More important, corn syrup improves the overall quality of the finished product.

Substantiation of the values of blended sweeteners came in the 1948 hearings of the Federal Security Agency, FDA, preparatory to the issuance of new standards of identity and fill of containers for frozen fruits[2].

One authority cited[2] the reduction of fruit dehydration through use of corn syrup as part of a blended sweetener, particularly with youngberries and strawberries. He said that the sheen and brightness of the fruit was "attractively different," also that the flavor was "less sweet when prepared in higher concentrations."

Frequently, too, he found the fruit flavor "showed through a little better, a factor particularly evident in the dark colored, highly flavored fruits." And he pointed out that "quality of flavor carried through was most desirable."

Other authorities[3] testified that peaches packed with a blend of corn syrup and sucrose sweetener did not oxidize as rapidly as when sucrose-packed, because the syrup sealed the fruit. And corn syrup also firmed the fruit.

A Look at the Factors

Made by the partial chemical conversion of corn starch, corn syrup is a clear, viscous, bland liquid. It is not as sweet as sucrose, its degree of sweetness depending upon the amount of dextrose and maltose sugars present. Carbohydrates found in the syrup are dextrose, maltose, higher sugars, and dextrins. Hydrolysis of the starch is controlled by the refiner to produce desired types of corn starch.

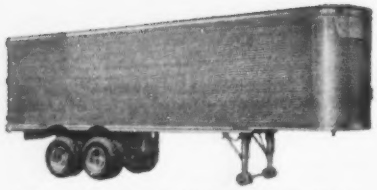
Corn syrups are classified according to the degree of conversion or total sugar content. At present, the generally accepted method is to express the quantity of total sugars as reducing sugars, which are converted to the equivalent of dextrose. Thus, D.E. (dextrose equivalent) is the percent of reducing sugars (on a dry-substance basis in a product) calculated as dextrose.

Sweetness becomes more pronounced as conversion progresses. A high D.E. syrup is made by prolonging hydrolysis to increase the amount of reducing sugars.

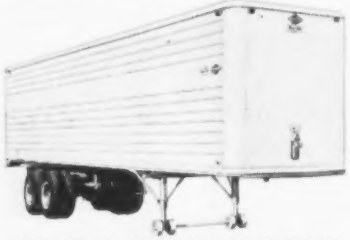
Four types of corn syrups are commercially available[4]. These are (1) low-conversion syrups with a D.E. below 40; (2) the 40 to 49-D.E. range, representing regular- or medium-conversion syrups; (3) the 50 to 57-D.E. range, including intermediate-conversion syrups; and (4) high-conversion syrups with a D.E. of 58 or higher.

Low-conversion syrups are the least sweet. Their high dextrin content make them heavy bodied. Because of the large amount of dextrins, they show, in dried form, considerable promise in bulk frozen-fruit packing.

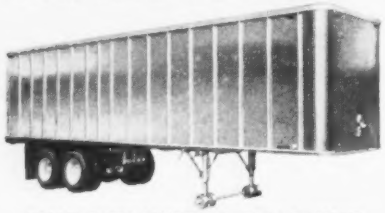
Regular- and intermediate-conversion types of corn syrups are principally used for processing frozen fruits.



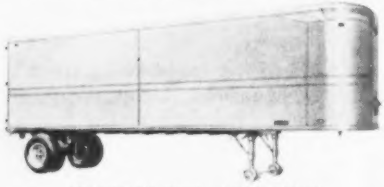
LONG-LASTING ★STAINLESS★ STEEL VANS



LIGHTWEIGHT ALUMINUM ROAD★STARS



HEAVY-DUTY ALUMINUM CAR★A★VANS



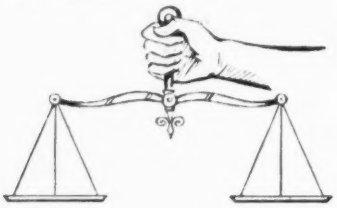
HI-TENSILE STEEL AERO★VANS

HOW LONG WILL IT STAND UP?

Will It Do Your Job Economically?

Will It Protect Damageable Cargoes?

IS IT WORTH THE PRICE?



Judge a Trailer

BY ITS VALUE!

PRICE ALONE is no criterion when you're buying a Trailer. There are some bargains that aren't bargains at all, if you ask this question: "Does the Trailer have all the specifications it *needs* to do my job?"

When you put a Fruehauf into service, you know it will stay there, hard at work—an asset to your business because of its *low* maintenance cost and exceptional strength and durability. It has feature after feature to give you profitable, dependable hauling for many more years than you can ordinarily expect.

Many of these Fruehauf features are exclusive—you can't get them elsewhere at any price. And *every* Fruehauf is the lowest-priced of its kind, specifications considered, because Fruehauf has the world's most extensive facilities for low-cost, high-quality Trailer production.

Be sure you get your money's worth, next time you buy a Trailer. To *be sure*, get a Fruehauf.

Fruehauf TRAILERS
"ENGINEERED TRANSPORTATION"

World's Largest Builder of Truck-Trailers

FRUEHAUF TRAILER COMPANY
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FOR HAULING ANY FOODS — *THE BEST BUY IS A FRUEHAUF!*

For more information, use coupon on page 159.

Used in a blend with sucrose, they aid in the production of an excellent frozen-fruit product.

Intermediate-conversion syrups, being slightly sweeter than the regular-conversion types, have a greater number of uses. They can be easily applied in a blend for packing frozen fruit for consumer trade. Due to their lower viscosity, they readily mix with sucrose syrup, giving the proper fluidity for thorough coverage and effective protection.

High-conversion syrups lend themselves to a number of special applications. Blended with sucrose, they greatly emphasize the sweetness of frozen fruits and closely approximate straight-sucrose syrup. They have the greatest proportion of dextrose and maltose, and the lowest of dextrins. Too, they are the most fluid.

Behavior of Blended Sweeteners

To retain the important characteristics of fruits, packers have developed methods of retaining flavor, color, and texture—qualities easily lost in careless or improper handling.

Compared with dry sugar, liquid packing media improve the flavor and texture of frozen fruits. Blends of dry sugar and dextrose, and also dry sugar and corn syrup, are widely used and yield quality frozen-fruit packs.

Density of a liquid sweetener or syrup is important in retaining the firmness of fruits. The interchange of heavier syrups for the lighter solutions within fruits postpones the natural collapse of frozen-fruit tissue upon defrosting. When absorbed, the heavier syrups give more stability to the fruit.

Flavor-carrying and enhancing powers are greatly emphasized with higher density syrups. Those containing a mixture of sugars, such as corn syrups, appear more effective in building up the solids of the fruit, in retaining the natural flavors, and in enhancing the color than syrups with only sucrose.

Defrosted fruits may quickly oxidize and collapse, unless protected. A surrounding syrup buoys up the fruit, firms the cells, and thus prevents collapse of tissues. Practical experience has shown that combinations of sucrose and corn syrups efficiently prevent contact of fruit with air and provide greater protection against oxidation than do dry sweeteners. The blended syrups diffuse into the cells and plump the fruit immediately after packing. Temporarily, the pack is protected from mold growth and drying.

Experiments were made by the Food Technology Department at Oregon State College on many Pacific Northwest-grown fruits packed with dextrose and corn syrups. Extensive studies were also carried out on fruits packed with a combination of sucrose and corn syrup, and then put up in consumer-sized packages. Corn syrups employed were chiefly those manufactured for general use. In a few instances, corn syrup with an unusually high D.E. was compared with the most common 42 D.E.-type. D.E. range of syrups used for experimental packs ranged from 24 to 63.

Corn syrups with various amounts of dextrose showed no significant drained-weight differences when statistically analyzed. Important in drained-weight studies is the variability of the fruit. For example, soluble-solids contents of fruits are generally not uniform. And variations in the size of cut pieces in a package cause differences in cut-out weight of the drained fruit.

A taste panel at Oregon State has

(*Turn to page 210*)

Quick Freezes and Cartons Shrimp at Sea

Packages move to market the moment ship docks at Miami . . . Refrigeration specialists handle vessel conversions to enable capacity processing

C. E. WRIGHT
FE Correspondent, Florida

New large-scale operation of Crossland Fisheries, Miami, is quick freezing and cartoning of shrimp right on the ship that catches them.

The frozen seafood is packed in 5-lb. cartons—all ready for the market when the ship returns to port.

Conversion of a 104-ft. ship—a surplus Army air-sea rescue craft named the *San Marcos*—set the stage for the company's advanced operation. The refitting was handled by the Gray Products Corp. of Miami, refrigeration specialty firm, at a cost of about $100,000.

Another ship, the *Drake*, a former patrol boat measuring 118 ft., is now undergoing similar conversion. The *San Marcos* will handle 30,000 lb. of shrimp, the *Drake* 60,000 lb.

Gray installed custom-built cooling and freezing equipment in the *San Marcos*, together with Mills and Acme units and acid-resisting coils. The installation was designed both for simplicity and economy of operation.

The *San Marcos* makes regular trips from Miami to the Campeche shrimp beds off the coast of Mexico, staying out 30 to 35 days and making a 700-mile trip each way.

Steps in Operation

Shrimp are dumped from the trawl into a shallow 10 by 14 ft. box on the port side of the deck, where they are first washed and re-washed in clean sea water. Then they are headed and immediately transferred to a pre-chilling vat a few feet aft of the cleaning box.

The pre-chilling vat, 3 by 4 by 6 ft. holds about 2,000 lb. and is provided with lock-down covers for rough weather. In this box the shrimp are cooled to about 40 deg. F. within 1 hr. Just enough cooling is applied to take out the animal heat and preserve the shrimp for the next step—the cartoning operation, which is done on benches forward of the chill vat and on whichever side of the ship is sheltered from the sun.

Filled cartons are immediately placed in insulated quick freezers. There are two of these custom-built boxes, each holding 1,000 lb. Further, these boxes can be operated from either one or both of the compressors on board.

The cartons are now glazed with frozen fresh water, but the Marine Laboratory of the University of Florida is conducting experiments to see if this glazing can be successfully done with sea water. This would be a distinct advantage, for the boat would then be enabled to stay out at least 40 days. Such lengthy runs are not now possible due to inability to carry sufficient fresh water supplies.

After quick freezing, the cartons of shrimp go in holding rooms, which have a capacity of 40,000 lb. Located aft and amidship, these rooms are insulated with Armstrong semi-rigid glass fiber. They hold the shrimp at 5 deg. below zero.

With the methods and equipment employed, Crossland Fisheries can catch shrimp from the sea bottom and quick freeze them within 2 hr. Shipments are made from Miami in refrigerated and insulated trucks using Thermo-King cooling control units.

It's almost unbelievable!

Sealva FLAVORS!

The New Hermetically Sealed are showing some remarkable performances.

In GELATIN DESSERTS, Sealva Lime flavor far outlasts other protected flavors in extended shelf tests.

In BOXED CHOCOLATES, Sealva flavored mints maintain their original strength and do not permeate other confections.

In PHARMACEUTICALS, Sealva Orange has done the impossible in a pleasant permanent taste mask in powders and tablets.

Sealva fruit flavors have made possible revolutionary new products in PREPARED MIXES and DESSERTS.

Sealva flavors are dry powders. Each droplet of flavor oil is completely sealed from the atmosphere with an edible protective film.

VAN AMERINGEN-HAEBLER, INC.
521 West 57th Street
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Alva FLAVORS

For more information, use coupon on page 159.

BY VIRTUE of dropped frame, floor of body is only 28 in. above ground. There are six doors (three on each side), and interior is divided by one longitudinal and two transverse screen partitions which carry wire shelves. Latter afford increased number of load positions, thus items are readily accessible without need for shuffling them.

New *Snap* in Their Deliveries

Using Low-Bed Truck With 6-Compartment Body

SIMPLER operation and hence reduced route costs are the advantages that Foremost Dairies, Inc., of Jacksonville, Fla., is gaining with its new special-chassis special-body ice cream truck.

This carrier is an excellent example of engineering progress through teamwork by truck-chassis maker and body builder. Result is a complete vehicle affording greater distribution performance per time on the road, thereby minimizing unit expenses in delivery.

Further, its design notably takes into account the sweeping rise in traffic congestion, the higher wages of drivers, their shorter working days, and the multiplying ice cream novelty items carried in the load.

Such problems were demanding special efforts toward a practical solution.

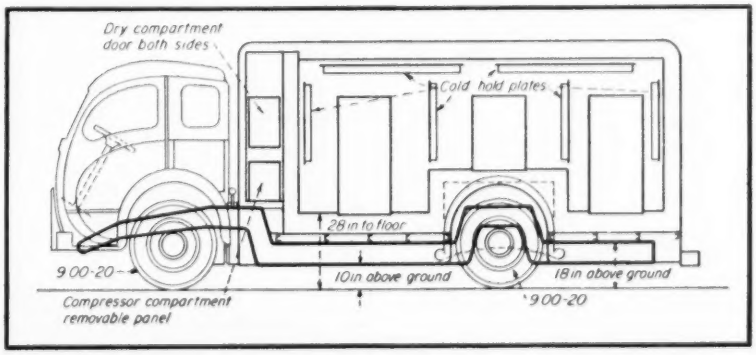
Low Bed, Handy Doors

The endeavor by Foremost, one of the largest ice cream makers in the South, involves adoption of a cab-over-engine (COE) chassis with a special low-bed frame. The latter accommodates a body into which the driver can easily step from the ground and in which he can stand almost erect.

Access to the load is via six doors, three on each side. And the goods are carried on handy shelves in six compartments formed by one longitudinal centerline and two transverse wire screens.

► **This type truck is seen as versatile for a variety of wholesale and curb-delivery services with food products—not only ice cream but also milk, soft drinks, beer, frozen foods, and many others.**

Division of the body interior by the screened shelves provides the required separate accommodation for the increasing number of novelty products. This makes it easy for the driver-salesman to quickly pick the specific items he needs without having to handle others—a condition com-



PROFILE sketch shows chassis details, major components, and features.

uniform surface retards wear ...provides greater pulley grip

Globe Solid Woven White Cotton Belting conveying layer cakes for boxing and wrapping in a modern bakery.

Long after other belts have lost their grip, Globe Solid Woven White Cotton Belting continues to move the goods that bakers bake . . . continues to move the grain that millers grind, that makes the flour that bakers bake!

This is the belting that is preferred by the baking and milling industries for light conveyor and elevator applications, because it is firmly woven into a balanced, continuous construction that eliminates excessive stretch and ply separation. It holds fasteners better than belting of looser woven construction. And its uniform surface has more resistance to wear, better pulley grip, and a better distribution of abrasive action.

Globe Solid Woven Cotton Belting is made in all widths up to and including 62", and in plies from 2 to 8 inclusive. Among allied industries using it are biscuit and cracker plants, cereal mills, and many other types of food processors and packers.

Prove Globe quality by comparison. Write Dept. F9 for free samples and literature . . . and the name of your local distributor.

GLOBE

WOVEN BELTING CO., INC.

KNOWN FOR QUALITY THE WORLD OVER

1400 CLINTON ST., BUFFALO 6, N. Y.

monly slowing the work in former arrangements.

Overcoming such delays of reshuffling the load on individual stops, the new bodies make for greater efficiency and lower-cost unit handling. The ease with which the driver gets on and off his truck is a contributing factor in driver efficiency.

Here the driver sits in a separate, unusually low, clear-floor cab especially designed to enable him to get in and out speedily. The outside step is only 18 in. above the ground.

Frame Details

The chassis which is employed here —Series 3000 COE of The White Motor Co. of Cleveland—varies from the conventional model in the feature of its low-bed frame. Instead of being horizontal for its entire length, this frame is bent downward between front and rear axles—to provide the low floor level—and extends up and over the rear axle for the body overhang, as shown in an accompanying illustration.

With 9.00-20 tires all around, the bottom of the frame is 10 in. above the ground and the top, 18 in.

With 6 in. of insulation, the inside body floor is only 28 in. above the ground.

Made by the Schnabel Co., Pittsburgh, the new body has a rated capacity of 1,750 gal. of product. Outside, it is 16 ft. 9 in. long; 8 ft. wide and 7 ft. 5 in. high. It has a non-refrigerated dry material compartment across the front end, giving one large refrigerated compartment with these inside measurements: 10 ft. 2 in. length; 6 ft. 4 in. width, and 5 ft. 6 in. height.

Insulation is 6 in. thick in the sides, ends, and floor, and 8 in. in the roof. Refrigeration is by six cold plates. Two of these are suspended horizontally from the ceilings, while four smaller plates are set vertically, one at each end, and one hung from each of two transverse screens.

With a centerline longitudinal screen from end to end of the refrigerated space, six compartments are formed. Each has its own door, so there are three doors on each side of the body.

The refrigeration source is a mechanical unit, gasoline engine driven, with its compressor mounted in the lower portion of the dry compartment at the front end of the body, and with an exterior door at the left side of the body.

Directly above is the portion of the dry compartment utilized for carrying packages of ice cream cones, displays and other advertising matter. This

compartment has doors on both sides of the body.

How It's Shelved

In the refrigerated portion of the body, horizontal shelves are hung on both sides of the centerline longitudinal screen framework and also on both sides of the two transverse screen frameworks.

These special shelves—made of wire instead of flat sheets in order to provide a better circulation of the cold air—give the body its broad accommodations for the many items.

Additional feature to remark in the White COE is its convenient tilt-cab. Through this innovation, the cab readily hinges down in front to facilitate engine maintenance—a feature introduced by White four years ago and now being followed by other manufacturers.

In contrast to Foremost's truck project to solve the pressing problems of gaining new efficiency in delivery performance, it is pertinent to point out the parallel approach of Pioneer Ice Cream Division of The Borden Co. This company has adopted a Ford step-in drive chassis with a stand-up body having shelves on both sides of a center aisle. (For its description see "Walk-In Truck Speeds Deliveries," FE Jan., p. 129.)

—*End*—

Optimum Cheesemaking

—*Continued from page* 129

is a 6-ft. American Blower fan. The latter, in turn, pushes filtered fresh air into the main 4x4-ft. aluminum ductwork, from which there are smaller take-off ducts to the various inlet grilles entering the large cheesemaking room.

Beside the main cheese room conditioner in the overhead corridor are two McQuay Inc., filtering and heating units that provide air to the Grade A processing areas and the office. Smaller units are suspended from the ceiling in the basement tunnel to serve the relatively compact intake, laboratory, and starter room areas. Cheese packaging also has a separate unit.

For each unit conditioner there is closed-loop recirculating air ductwork running from the area served back to the conditioner. This permits re-use of already warmed air in wintertime, when complete fresh air circulation would be costly.

Automatic Controls

Temperature of the air to each area is regulated thermostatically by means of a Johnson Service pneumatic system. Controlled air from the wall-mounted thermostat in the area positions an air-operated valve in the steam supply line to the heating coils of the associated unit conditioner.

Humidity of the air is controlled by the amount of outside air brought into the system and also by exhaust fan operation. Two pneumatically operated dampers—in the fresh air duct and the recirculated air duct just before each unit conditioner—are hand controlled from a nearby wall-mounted rheostat to permit a 0 to 100 percent adjustment in fresh air.

As the fresh air damper is positioned toward open, the recirculating air damper moves proportionately toward the closed position.

Usually, almost complete fresh-air circulation is resorted to in summer, with humidity control no problem. However, when artificial heating is required and air is recirculated, it then becomes important to correctly proportion incoming cold, low-humidity air into the system to keep the r.h. within desired bounds.

Mold contamination is a serious

Special on Ingredients Coming in June

By judicious selection of ingredients, a food manufacturer not only may improve product quality, but reduce costs as well.

To achieve these benefits, however, you must know what varieties of ingredients are available and what they will do for you. Supplying that information is the purpose of the 32-page Ingredient Special in June. Here are some of the ingredients to be discussed:

Fats and Oils	**Edible Gums**
Newer Enzymes	**Food Starches**
Phosphates	**Sealed-In Flavors**
Pectins	**Corn Sweeteners**
Vitamin A	**Liquid Shortening**

But more! June FE also will describe a revolutionary new sterilizing process. And it will carry other articles of value to the various branches of the industry.

"WE RECOMMEND THIS LUBRICANT TO OUR CUSTOMERS"

—says PACKAGE MACHINERY COMPANY
Springfield, Mass.

"We have found LUBRIPLATE Lubricants to be very effective and use them extensively in our machines. To assure the proper use of LUBRIPLATE Lubricants for re-lubrication, we place tags on our machines before shipment. Thus the purchasers of those machines know the LUBRIPLATE Product we recommend for each application and where to obtain it."

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

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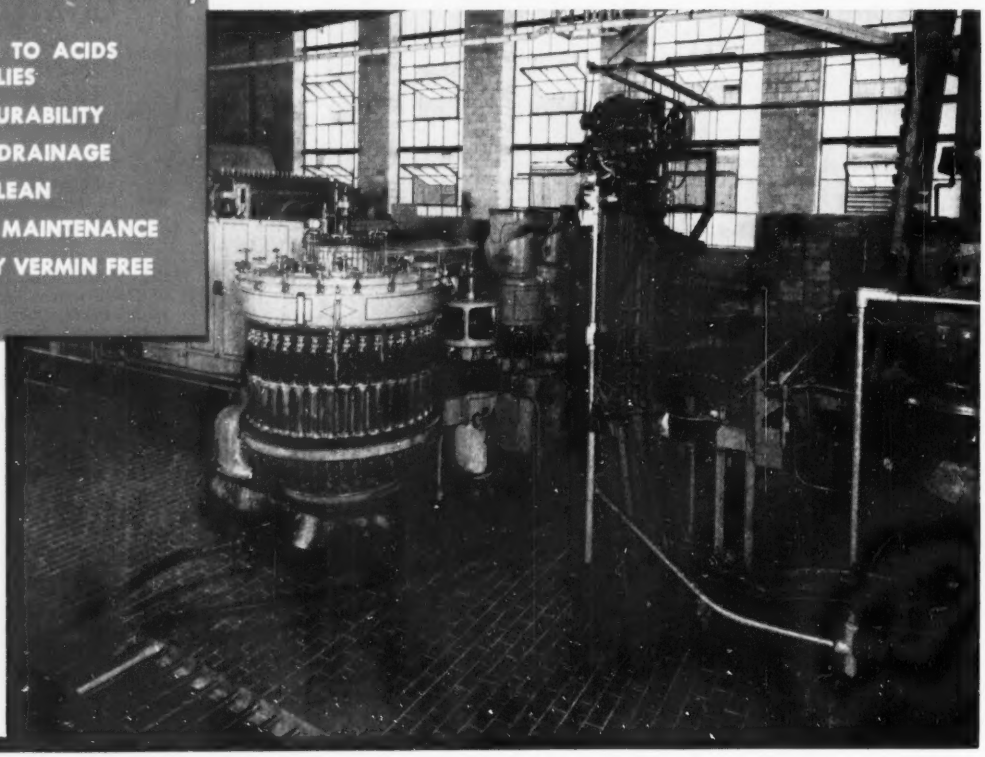
Superior

ON 9 IMPORTANT COUNTS

- HANDSOME APPEARANCE
- EXCELLENT SANITARY PROPERTIES
- RESISTANCE TO ACIDS AND ALKALIES
- EXTREME DURABILITY
- FAULTLESS DRAINAGE
- EASY TO CLEAN
- LOW COST MAINTENANCE
- COMPLETELY VERMIN FREE
- LONG LIFE



Bottle Filling Room
Gunther
Brewing Co.
Baltimore, Md.

The demands made by food processing industries of a floor are astronomical. It must be good looking. It must be sanitary. It must be easily cleaned. High resistance to impact—as well as to the corrosive action of acids, alkalies and repeated wash-downs—is absolutely essential.

What floor meets these sky-high requirements? Drehmann Sani-Brick. Only Drehmann offers all the properties essential to low-cost, trouble-free, long-life service.

Consider the advantages of converting now to Drehmann Sani-Brick. The Drehmann organization itself designs, engineers and installs every floor. Sani-Brick can be laid right over your present floor. And, amazing at it sounds, Drehmann has perfected a technique that enables this work to be done while your plant runs full blast. No costly "down-time." No interruption of production.

Remember, when planning new construction, solve the floor problem at the start by instructing your Architect to specify Drehmann.

Write for Bulletin M-1 "Modernize Worn Floors Economically."

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For more information, use coupon on page 159.

business in natural cheesemaking and packaging, and the use of filtered air in the Kiel plant is an important aid in lessening such contamination. Also, the construction features—as tile walls and floors and concrete ceilings—permit liberal use of water for cleaning. This minimizes mold-carrying dust.

Permanent filters are used because of their low maintenance cost. Every three months each unit is easily removed from its mounting and washed in a special tank with hot water and a cleaning compound that eradicates the accumulated dust and dirt.

End (Resume reading on page 131)

Rubber Conveyor Belting

—Continued from page 74

surfaces. Don't twist sharply. Before belt is run, check for tools left accidentally on the return side. Don't use excessive tension in pulling the belt over the idlers and pulleys.

Maintenance Organization

Responsibility for belt maintenance should be delegated to one man who, with his assistants, checks lubrication, investigates condition of idlers and pulleys, examines the belt for excessive wear, inspects splices at frequent intervals, and repairs cuts and tears as soon as discovered, using a well-maintained kit of belt tools. This man-in-charge should also check the belt for oil and grease, which should be removed. Over-lubrication of pulleys and idlers should be avoided.

In large companies using many thousands of feet of belting, a rather elaborate organization may be justified, including a belt repair shop with both portable and permanent vulcanizing equipment, and such aids as belt tables and drying racks.

Even in the best regulated plants, some material falls off the carrying surface of the belt onto the bottom cover or return side. If not removed, severe belt damage can occur when the belt travels around the pulley and the misplaced pieces are squeezed between belt and pulley. Brushes and scrapers are often used. But the best solution to the problem is to completely cover the return side of the belt with a wooden or metal deck.

When a permanent installation is made out-of-doors, it will probably pay to cover the belt with a wooden or steel structure. This will keep off direct sunlight, which speeds up oxidation, another enemy of rubber belt. One company has covered a wide belt with a long Quonset hut, which is heated in winter.

In order to get the maximum service life out of conveyor belting, users should take particular care to repair all belt damage as soon as it is discovered.

Notes on Repairs

Belt fabric exposed to weather will absorb moisture if the protective cover becomes damaged, and may even become thoroughly soaked. In warm weather, this condition leads to mildew and rot; in winter, ice crystals may gnaw at the fabric from within as the belt flexes. Thus, immediate repairs not only prevent the spread of damage, with its threat of premature failure, but also keep out the water, which is the natural enemy of the conveyor belt carcass.

Simple tools and procedures will help the maintenance man to give the belting proper attention. An adequate repair kit includes cobbler's knives and a stone to keep them sharp, a supply of emery cloth, rubber cement, inner-tube patching rubber, rip plates, and standard belt fasteners and accessories, together with rags and gasoline for cleaning. As each belt is installed, remnants should be saved, because they will prove useful in subsequent repairs.

To mend long, deep cuts through to the fabric, open the cut, clean out all dirt, and cement the cut closed, allowing the cement to dry thoroughly before the belt is restored to service. Where bits of torn cover leave exposed spots with only slight damage to the fabric, remove the loose ears of cover stock by carefully cutting a curved and bevel-edged area around the spot; then sand the edges and finally apply the patch flush with the belt cover.

Points where gouges have penetrated the belt, or longitudinal rips have occurred, must be cleaned, sanded, cemented, and reinforced with rip plates at 3-in. intervals. Transverse rips require similar treatment, but with standard belt fasteners instead of rip plates.

When holes in the belting do not permit the simple use of rip plates and fasteners, cut out the hole to form the smallest possible rectangle with its sides parallel to and at right angles to the belt edges. Then, from belting remnants, cut an exact fit for the hole and insert the piece, fastening it with belt fasteners all around the patch. Cement all edges thoroughly. Where it is necessary to prevent seepage of fines through belt repairs, remove one ply of fabric from a belt remnant and place it under the fasteners and rip plates.

Vulcanized patches are superior to those described above, but they require use of a portable vulcanizer,

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rubberized fabric, tie gum, cover stock, a one-ply knife, and fabric pliers. In preparing a vulcanized patch, work down into the damaged belt as far as necessary by removing progressively-smaller blocks of fabric with each successive ply. Then clean, roughen, and cement the cavity, and neatly fit in blocks of new fabric, finally applying the uncured cover. Skive the edges of the patch flush, and vulcanize.

Such patches cannot be made successfully unless the belt is dry, because moisture will form internal steam blisters. For this reason, large users have drying racks in their maintenance shops. Only very large users of conveyor belting will find it economical to vulcanize their own belt patches and splices. Small users may call on the the manufacturer or his distributor for splicing and repairs.

End *(Resume reading on page 75)*

Refrigerating Pecans

—Continued from page 85

waxed paper, or similar type bags, were very effective in protecting meats from ammonia.

Commercial Test Case

Severe ammonia damage to unshelled pecans in a commercial refrigerated warehouse was studied. About 100,000 lb. of unshelled pecans in 100-lb. burlap bags were refrigerated throughout the summer of 1951. The room was cooled with direct expansion ammonia coils with no forced circulation. The temperature was maintained at 36 deg. F. and the humidity at approximately 70 percent—conditions satisfactory for storing unshelled pecans. Bags were stacked about 8x10x20 ft. with 4-ft. aisles. Some touched overhead ammonia coils.

Ammonia damage was detected after 8 months, though no gas had been noticed in the room. Nuts were examined from 29 locations in the room and from 5 within several bags. Examinations revealed that—

1. All ammonia damage occurred in a corner of the room, none being detected more than 30 ft. from that corner. Thus, the gas leak was easily located.

2. There was little or no damage to nuts on the floor. Discoloration was found only near the ceiling.

3. Damage was worse to the most-exposed nuts, especially those in the end of bags at aisles or the upper side of topmost bags.

4. Ammonia diffusion through the room was very poor, as indicated by the localized damage. Diffusion through the bags was also poor. Many of the individual nuts were damaged more on one side, further indicating poor gas diffusion.

Darkening of pecan meats is apparently a reaction between an alkali and tannins or anthoxanthins in the seed coat. Tests showed that not only ammonium but also potassium and sodium hydroxides produced similar discoloration. Aqueous or alcoholic extracts of the packing tissue of pecan shells acted as an indicator, turning black in alkaline and light tan in acid solutions.

To restore normal color, ammonia-darkened meats were exposed to a 5 percent ascorbic-citric acid solution, chlorine solution (1,200 ppm.), concentrated hydrochloric acid fumes, dilute hydrochloric acid solution, sulfur dioxide, sulfurous acid, water, and aeration.

Ascorbic-citric acid solution and fumes from hydrochloric acid or sulfur dioxide temporarily restored the normal color. But after neutralizing or evaporating the acid, the dark color returned. Effect of bleaching was of short duration. Bleaching occurred only with application of the agent within a few hours after discoloration took place. It was entirely ineffective after the meats had been discolored several days or longer.

Varieties of pecans varied in their susceptibility to ammonia damage. Data show that thinner-shell nuts and those with a small amount of packing tissue, such as Schley, Mahan, and Curtis, were more susceptible to ammonia. Poorly filled Mobiles, with a large amount of packing tissue, were less damaged than well filled varieties such as Farley, Van Deman, and Pabst.

There was a difference in susceptibility to ammonia in varieties after shelling. Schley and Curtis were very susceptible. Less susceptible were Desirable, Farley, Moneymaker, Van Deman, Success, and Mobile.

Findings Briefed

Pecans mature in October and undergo about a month's after-ripening. During this period, the moisture drops to about 3.5 percent and maximum flavor develops. It is important that biological activity be curbed at this point to avoid staleness or rancidity. For this purpose, 32- to 34-deg. F. refrigeration has been found more satisfactory than vacuum packing or preheating.

Unshelled nuts can be held in common storage during the winter, provided the room is dry, cool, and free from odor or insects. But as spring approaches or after the pecans are shelled, they should be refriger-

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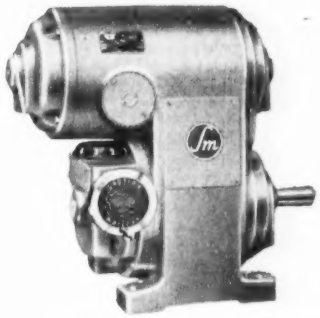

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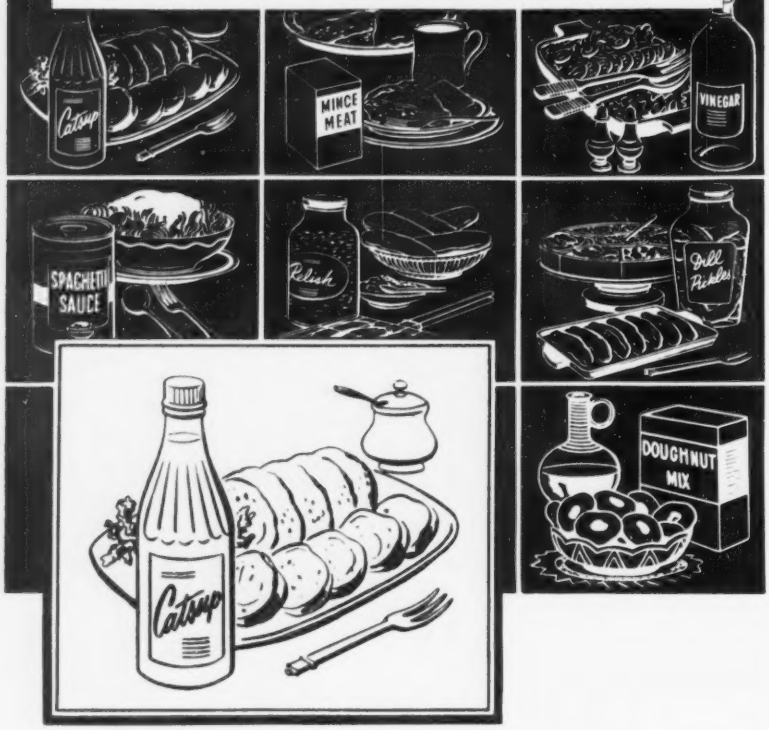

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ated. Deterioration also occurs rapidly when the storage temperature fluctuates widely.

Refrigeration at 32 to 34 deg. F. preserved the fresh color, aroma, and flavor of pecans; retarded staleness and rancidity; arrested molding; prevented insect infestation; and checked absorption of foreign or storage odors.

By using lower temperatures, pecans retained their quality over a longer period. In general, storage life of unshelled pecans was about four times that of the shelled nuts. However, this varied with the variety of unshelled pecans and the amount of broken pieces in the shelled nuts.

Unshelled nuts were held at 32 deg. F., or lower, for 2 yr.; at 40 deg. F. for 18 months; and at 48 to 50 deg. F. for 9 months. At 32 deg. F., or slightly below, shelled pecans remained perfect from season to season.

Maintaining humidity at about 68 percent and a moisture content in the nuts of 3.5 to 4.5 percent (regardless of the temperature) was very important. Dry, shelled pecans were brittle and lacked palatability, while moist meats were clammy.

Storage life of pecans depended upon oil and moisture contents, thickness of shell, or amount of bruising of meats rather than strictly varietal qualities. Thus, varieties with a low oil content, such as Schley and Curtis, became rancid quickest. Also, those with thick shells had a longer storage life than those with thin-shells.

Short storage life of shelled pecans, as compared with unshelled nuts, was due to the greater bruising and breaking, as well as exposure to air.

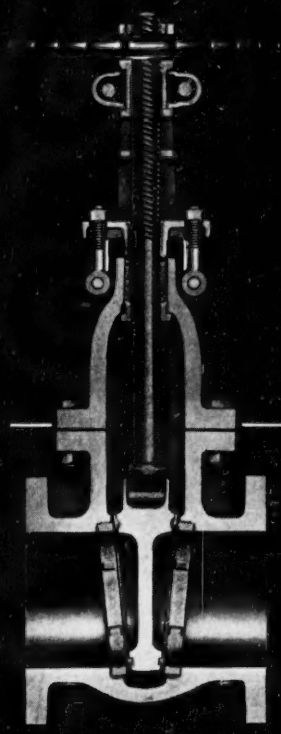
Pecans blackened upon exposure to ammonia, even in concentrations too low to smell. While discoloration was only in the seed coat and the flavor was seldom affected, the appearance made them unmarketable.

No method of permanently neutralizing the black color was found.

Unrefrigerated shelled pecans absorbed odors from other stored commodities or fumigants much more readily than refrigerated nuts. Unshelled pecans picked up flavors and moisture much more slowly.

The above article was based on a paper presented at a recent New York City meeting of the American Society of Refrigerating Engineers. The research reported was sponsored jointly by the Georgia Experiment Station and The Refrigeration Research Foundation, and it is published as Georgia Experiment Station Paper No. 228, Journal Series. S. R. Cecil assisted in the chemical analyses, Helen H. Thompson and Sara Siewert in organoleptic evaluations.

End (Resume reading on page 86)



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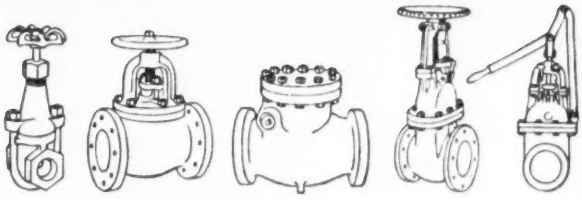

Iron valves in gate, globe, angle, check, and lubricated plug types are manufactured by Walworth. Illustrated is a sectional view of a Walworth No. 726F Standard Iron Body, Bronze Mounted, Wedge Gate Valve with flanged ends. This line of valves is available in sizes 2 to 30 inches. Similar valves of All-Iron type are also available.

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British Spur Sales With Coronation Theme

Taking advantage of wide interest in the coming English coronation, British food importers are introducing many of their items in coronation souvenir packages.

And many stores are devoting exclusive shelf displays to this specially packaged merchandise.

Though packages have been designed principally to appeal to souvenir-type buyers it is recognized as a good opportunity to acquaint the American public with various British food imports which are now available to them.

Some of the striking examples (shown above) are:

Round tin, containing 17 oz. of an entirely new assortment of English biscuits. Product of Huntley & Palmer Ltd., London. Container features a full-length, life-like portrait, on a blue tinted background, of the royal couple in ceremonial robes. Around sides are shown emblems of various British colonies, as well as photographic reproductions of Windsor Castle, Westminster Abbey, Buckingham Palace, and the Palace of Holyrood.

Rectangular tin, containing 7½ oz. of assorted toffees, which are individually wrapped in foil and cellophane. Product of Edward Sharp & Sons Ltd., Maidstone, Kent. Depicted on cover is vividly colored, true life portrait of Queen in regimental uniform.

Cylindrical tin of Thorne's of Leeds. This is a ½-lb. tin of assorted toffee, each piece wrapped in variegated colors, some with foil and overwrapped with cellophane, others wrapped with a combination waxed paper and foil. Container, with removable lid, is tinted in warm browns and reds. It features individual profiles of the royal couple.

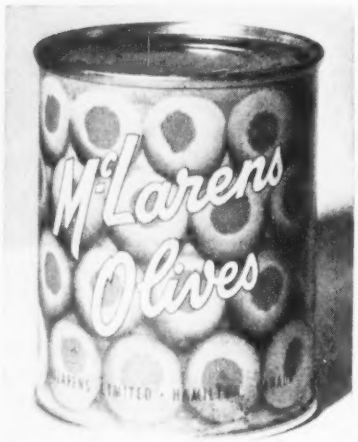
This company also is marketing a ¼-lb. round tin depicting the Queen in riding habit saluting from her mount, and a 1-lb. square container with a portrait of the Queen wearing her coronation crown.

From Wiltshire Bee Farm of A. W. Gale, Marlborough, comes the 1-lb. 3-oz. glazed earthenware mug filled with pure heather honey. Container is embossed with a profile of Queen wearing her crown, framed with royal crest.

Tickler's, London, producer of various specialty jams and preserves offers a cylindrical earthenware jar, with removable cover, in which is placed a 1-lb. container of its famous orange marmalade. The jar is embossed with an attractive profile of the crown-wearing Queen within a frame of English flags.

Designs were carefully selected, and the claim that the best creative art of England's foremost lithographers was used is borne out by the excellence of detail, color, and true life reproductions.

Contents of all these items were found to be attractive both to eye and taste and well packed. All are overwrapped with cellophane or are sealed with a band of adhesive-type tape for additional protection.



Stuffed Olives in Cans

After considerable research, American Can Company's Canadian division and McLarens, Ltd., Hamilton, Ont., Canada, have succeeded in packing imported stuffed olives in metal cans. Experiments indicated that olives stayed fresh and tasty both in plain and enamel-lined cans.

Olives are loosely packed in can and are said to retail for about eight cents less than those in other types of containers with same number of olives.

McLarens' colorful lithographed label on can gives impression of actually seeing through container.

For Package Data Use Reader Service, p. 159

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Prepackaged Sliced Cheese—It's Interleaved

A new innovation in prepackaging its Brookfield sliced cheese has been announced by Swift & Co., Chicago.

Eight 1-oz. slices of cheese are individually separated by moisture proof paper and overwrapped with a colorful heat-sealed film.

A continuous strip of paper folds back over each slice of cheese. As the paper strip is lifted, each slice separates from the one below it. This eliminates sticking together and breakage of slices.

This "interleaved" cheese is now available in American, Swiss and American, brick and American, pimento, and "Old York" sharp American.

New Quick Drink Mix

"Kold Kup" drink mixes, complete with sugar, are being introduced by Wyler & Co., Chicago. They are packed in 3-oz. heat-sealed, aluminum foil envelopes (Milprint Inc., Milwaukee). Four flavors are offered—grape, strawberry, orange, and cherry.

As sugar is already included in the mix it is necessary only to add one quart of ice water to contents of envelope, mix and serve.

Flavor can be identified by bright coloring on package suggestive of contents—red for cherry, orange for orange, etc.—in addition to bold, clear lettering in contrasting colors.

For Package Data Use Reader Service p. 159

Baby-Size Packages

Beech-Nut Packing Co., Canajoharie, N. Y., is now packing its well-known precooked baby cereals—barley, oatmeal, corn and cereal food—in 4-oz. containers.

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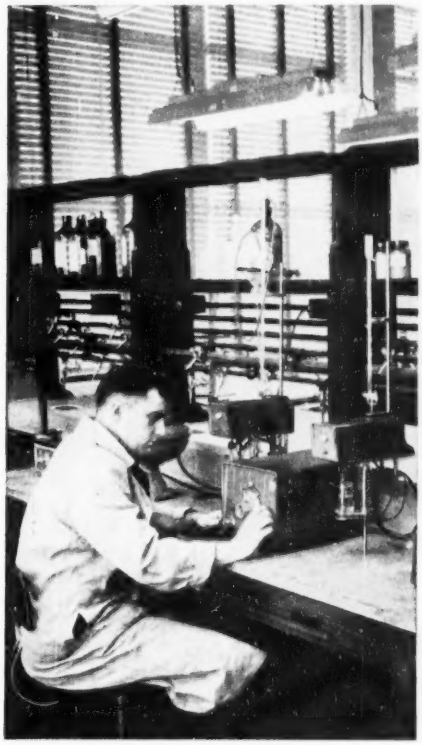

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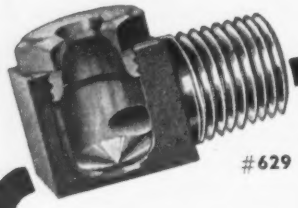

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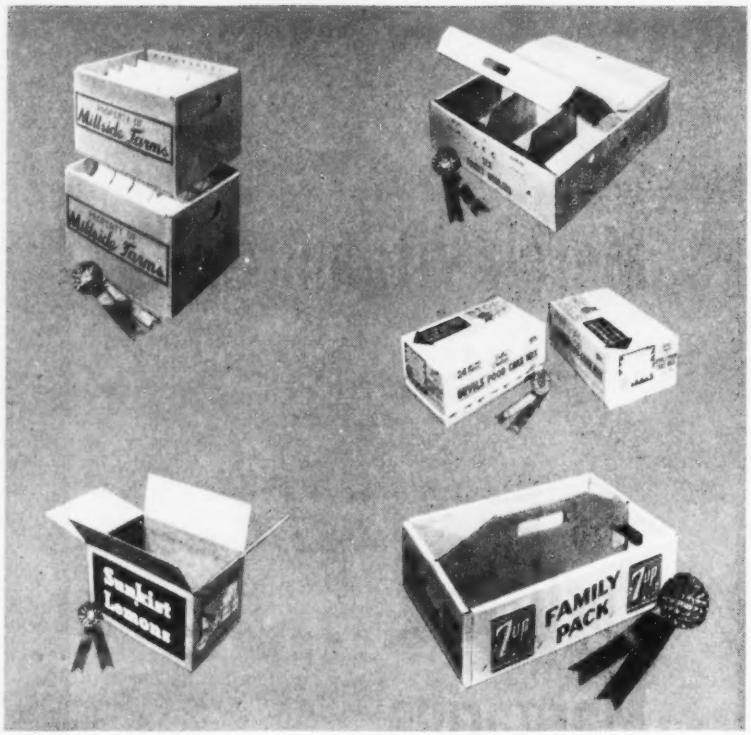


Fiber Boxes for Foods Take Many Awards

At the recent Fibre Box Association meeting in Chicago, it was announced that in 1952 almost 6,000,000 tons of corrugated and solid fiber boxes were produced in the United States, representing a dollar volume of $1,200,000,000. Of this, 32.6 percent was used in the food industry and 4.3 percent for beverages. The important role this material plays in the food and beverage industry is further evidenced by the fact that out of 72 awards made in 17 different classifications in the association's first annual competition, at least 27 were in the food and beverage field.

Shown above are first prize winners. They are:

Container for Other Articles of Food: Shipping container for milk cartons. Manufactured by Kieckhefer Container Co., and Eddy Paper Corp., Chicago, for Millside Farms, Riverside, N. J. Contains 20 milk cartons. Equipped with hand holes and drainage holes. Has extended double bottom structure to permit vertical tiering of a number of cases.

Fresh Fruit & Vegetable Outer Shipping Container: Orange and lemon box. Manufactured by International Paper Co., New York. User: College Heights Orange and Lemon Assoc., Claremont, Calif. Box has double-wall liner coated with a mold inhibitor and board itself is treated to produce rigidity.

Meat & Poultry Container: Shipping Container for frozen turkey. Manufactured by Waldorf Paper Products Co., St. Paul, and distributed by Minnesota Filler Co., Minneapolis. Six compartment box has two fixed fillers and a center divider to provide stacking strength and to prevent shifting of product. Requires no tape or stitching and top may be folded back for ventilation during freezing process.

Novelty Features: Cake flour container. Manufactured by Downing Box Co., Milwaukee, for General Mills, Inc., Minneapolis. Unique is the quick and easy opening "tear strip" which eliminates need for opening with knife. Top can be lifted off.

Carry Home Packs: Beverage carry-home pack. Manufactured by Waldorf Paper Products Co., St. Paul, for 7-Up, St. Louis. Two piece family pack is easily assembled and holds 24 bottles.

Another first prize in food field (not shown) was in floor stand and display class. This was a floor display stand manufactured by Kieckhefer Container Co., and Eddy Paper Corp., Chicago, for Kraft Foods Co., Chicago.

For Package Data Use Reader Service p. 159

Frozen Brownie Dessert

Frozen in one piece with scoring for easy separation, chocolate nut brownies are offered by Heat & Serve Corp., Philadelphia.

Marketed in 7-oz. cartons under "Frost Bake Swiss Pastries" label, this dessert contains wheat flour, cane sugar, pure chocolate, walnuts and/or pecans, egg whites, vegetable shortening, salt, and vanillin.

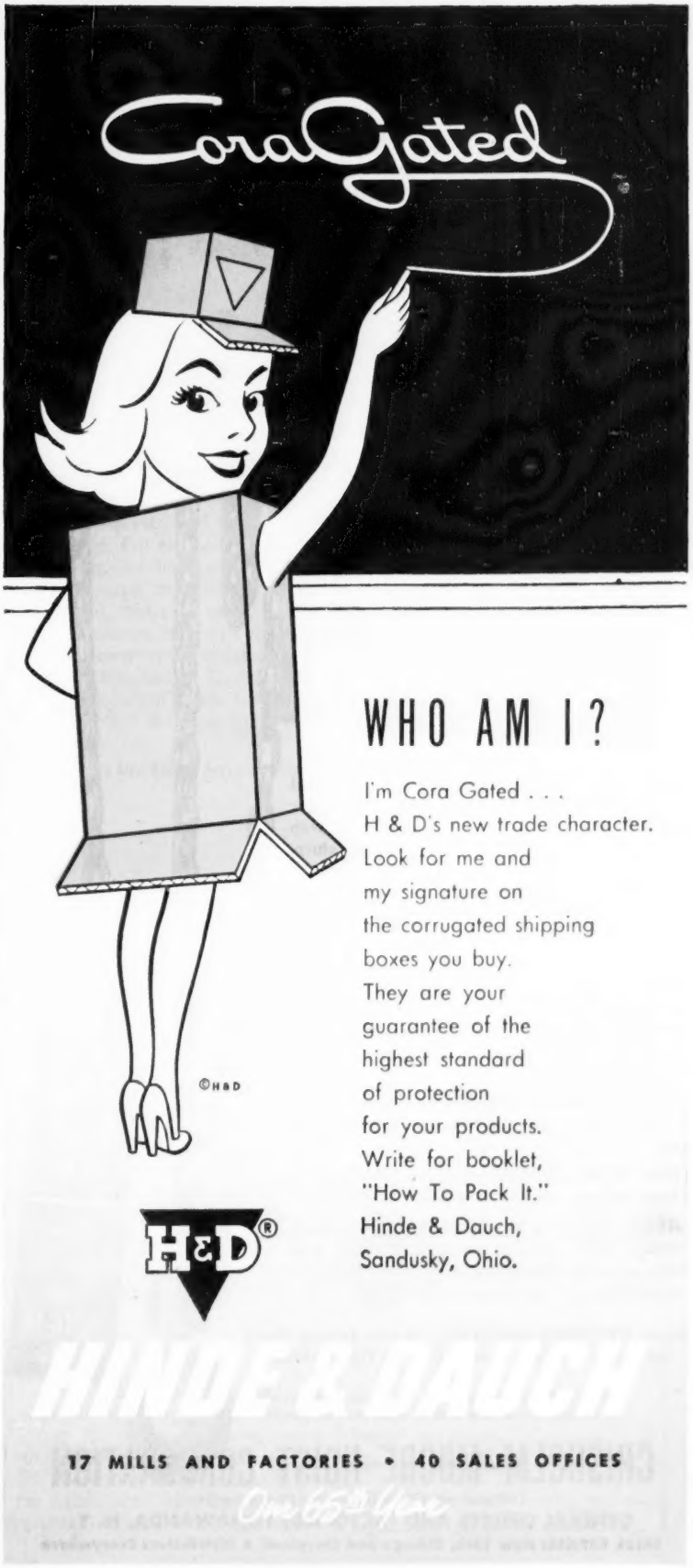
Brownies can be served either frozen or unfrozen.

Dinner With a Twist

Buitoni Foods Corp., New York City, is now putting the makings for a complete spaghetti twist dinner in one convenient carton.

Contents consist of one 8-oz. package of non-salted spaghetti twists which can be prepared in seven min.; one 8-oz. can (American Can Co., New York City) of concentrated Ragu sauce, consisting of tomatoes, meat, cheese, butter, olive oil, wine and seasoning; and, a 1¼-oz. shaker of mild, grated Parmesan cheese.

These items are packaged in one colorful red and yellow chipboard carton which is designed to attract attention of several types of buyers. To catch eyes of children and sport fans, the carton prominently advertises that this is "Joe DiMaggio's Favorite" with two characteristic poses of the famous



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ball player. Then, to appeal to the diet conscious buyer, the phrase, "Lower in Starch" is displayed on both large carton and on spaghetti box. Finally, for those interested in speed and ease of preparation, it is stated that this meal can be prepared in a matter of seven min. and will yield four generous portions.

For Package Data Use Reader Service p. 159

Canadian Bacon Pack

Sliced Canadian-style bacon in a conventional bacon pack is now being marketed by Gold Medal Packing Corp., Utica, N. Y.

Slices are arranged in an overlapped row in a flat folding waxed chipboard carton and overwrapped with cellophane.

Bacon is clearly visible through upper half of package presenting definite appetite and eye appeal. Each ½ lb. pack contains an average of 20 slices.

Quick Melting Cheese

A new type cheese product is being distributed by Kraft Foods Co., Chicago, under label "Cheez Whiz".

Because of consistency of this spread, it is particularly suited for use in recipes where fast blending and melting are desired.

Cheese is packed in 8-oz. glass jars, with "vapor-vacuum" closures (White Cap Co., Chicago).

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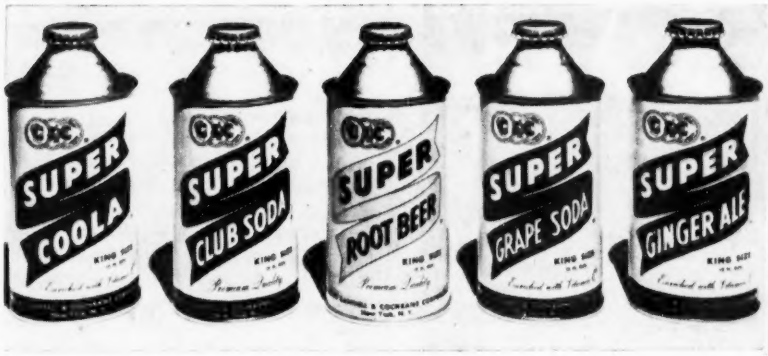

Revolutionary Innovation in Soft Drink Container

For the first time in history, carbonated beverages are being sold commercially in a no-deposit, no-return can. This radical change in method of marketing is being made by Cantrell & Cochrane Corp., New York City. Distribution is being made in New York area with plans to go national in the future.

Contrary to general soft drink practice these canned beverages will be centrally manufactured and sold by direct distribution through chains and wholesale grocers instead of by store-delivery through small franchised bottling plants. There are no franchises in this new operation.

Five flavors are presently available —Coola, club soda, root beer, grape, ginger ale—in 12-oz. "King"-size cans.

Many advantages are cited in use of cans to both trade and consumer. *For the trade:* No breakage, time saving in storing, sorting and handling returns and deposits, and less storage space required; *For the consumer:* No cash deposits, no bottles to return, no glass breakage, no sticky empties laying around, easier to carry, much less space in storage, and faster cooling.

Cone top cans with regular bottle-type closure, supplied by Continental Can Co., Inc., New York City, are designed for safe drinking right out of container.

For Package Data Use Reader Service p. 159.

—End—

In-Can Baking Perfected

—Continued from page 87

Early in the experimental program, the dangers of *C. botulinium* toxin occurring in canned bread were considered. The early formula was high in non-fat milk solids (6 percent) and their buffering action kept pH above 5.0. Since baking did not raise the internal temperature of the product above 212 deg. F., there was a possibility of spores surviving in the can.

Four years of bacteriological research, including varied inoculation doses of spores and incubation periods for inoculated cans, indicated that there would be no danger of botulinium if the pH were kept below 4.8 and moisture under 33 percent.

Subsequently, the following formula was developed (ingredients are listed in parts by weight): Flour, 100.00; water, 50.00 or less; yeast, 2.00; salt, 1.75; sugar, 8.00; shortening, 12.00; buttermilk solids, 2.00; edible lactic acid (60 percent), 0.30. Details on these ingredients and attendant manufacturing qualifications are available in the published military specification, MIL-B-1070A, Dec. 7, 1950.

While this formula effectively holds moisture and pH to safe limits, it also produces a dough that is quite stiff and which requires a long baking time. Hence, further research is now in progress to determine if a high moisture content can be used. One reason for keeping the pH constant is to prevent "rope" (*B. mesenterious*) growth, which may lead to a dangerously high pH and water content in the can.

In-Plant Operation

Since this was Interstate's first experience in baking canned bread, no attempt was made to set up permanent facilities at our Long Beach plant.

Sponge for the dough was mixed at 77 deg. F. in our regular mixers and allowed to ferment for 3 hr. at 80 deg. F. Shortening, buttermilk solids, and the edible lactic were then added at the dough mixer, which also was

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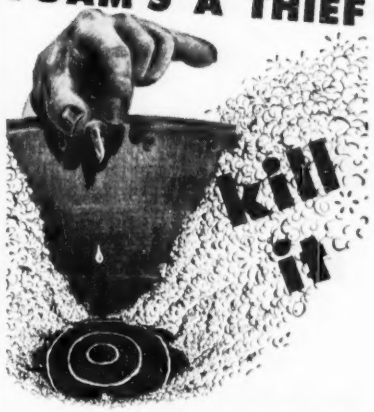

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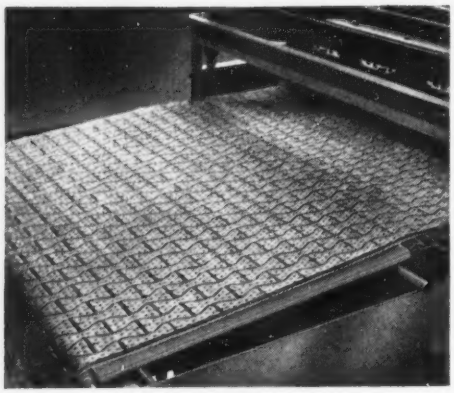

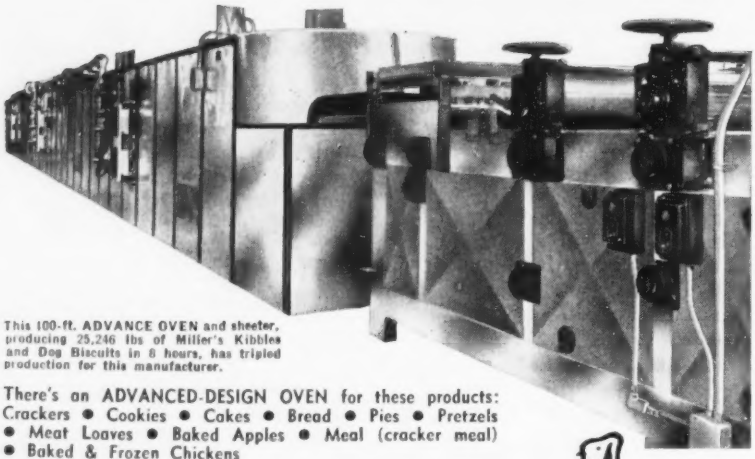

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held at 77 F. The mix was then scaled and formed into 5 oz. pieces of dough by one of our regular bun machines.

The "baking pan" was a No. 2½ can of 80 base weight tinplate, lacquered inside and painted an external olive drab. Empty cans, after being belt conveyed underneath an air blast to dislodge dust, were hand-packed with two greased pieces of dough. Further along the conveyor, a lid was loosely clamped onto each can by a clinching machine—similar to those used in canneries. Lidded cans were then placed in a wire basket and finally on a mobile eight-shelf floor rack holding 800 to 1,000 cans. Loaded floor racks were then rolled into the proofbox for proofing to the proper height at 86 deg. F., 84 R.H.

It was found that each batch could be proofed with a high degree of accuracy by simply having one can in each rack with an unclinched lid. When the dough in this particular unit was noted to have risen to the proper height, the rack was then rolled from proofbox to oven.

After baking in our regular traveling tray oven for 35-40 min. at 450 F., the trays were moved onto a power-driven conveyor, which elevated them to about 5 ft. above floor level, where they traveled onto a gravity conveyor to the can sealing machines.

In traveling from oven to sealing machine, the loaf was in transit about 4½ min.—this cooling time making it possible to obtain a subsequent vacuum of 16 to 20 in., as required by the specifications. This phase of operations required careful timing inasmuch as the desired vacuum resulted only when cans were sealed at an internal temperature of 196 to 198 F.

Vacuum Tester Devised

Because of the dangers that might grow out of an improperly sealed can, a vacuum testing device, called the "flip tester," was devised by the can-supply people for automatic use on the moving line.

Essentially, the "flip tester" consisted of a cupping arrangement that clamped down on the lid of each passing can and exposed it to an external vacuum of 16 in. If the internal pressure against the lid was less than 16 in., movement of the lid would actuate a microswitch in the clamping cup and the can would be ejected from the line.

It might be mentioned that a very high can vacuum is theoretically desirable in that the product will be more stable due to minimized oxidation and less chance of rusting. However, white bread does not exert enough force against a normal 80-lb.

base weight can to prevent paneling above 20 in. Hg. Pound cake and fruit cake, on the other hand, can be hot-sealed right out of the oven and will hold shape at 25 in. of vacuum.

Cooling the bread to an internal temperature of 90 F. within 30 min. after sealing was accomplished by using large squirrel-cage fans blowing through water-soaked excelsior. For this cooling operation—which is required by the "specs"—the cans are placed back in the wire baskets and eight-shelf racks and discharged from here onto a conveyor leading to the shipping department.

Production ran at the rate of 48 cans per minute—about 46 doughs, or a total of 50,000 cans, was the usual daily production.

Recent Observations

It is gratifying to report on the field acceptance of this first trial procurement of canned bread—as relayed to us by Dr. Bob Larsen, chief of the Cereal & Baked Product Div. of the Institute. Baked in June, the product was tested in the field during the following January and was preferred 6 to 1 over the crackers which had been the previous ration.

Tests have shown that the acceptability of this canned bread does not change significantly over a storage period of 1 yr. at 70 deg. F. The acceptability, of course, increases if the can is served warm (usual method is to heat a sealed can for 10 min. in boiling water).

Aside from the bacteriological problem, which is still being actively pursued from the formula standpoint, the two major problems facing the Institute in its development of canned bread are perfection of the container and elimination of browning.

Container Requirements

Cans used for the canning of bread are hermetically sealed and are the open-top, round cans with a key opening attachment. They are made from 80-lb. base box weight and coated with 1.25 lb. of tin per base box. The container is coated on the inside with a heat-and-grease resistant enamel.

It has been found that wherever bare metal is exposed—at the seam, score, or key attachment, for example—rust spots are likely to develop in the product. This problem is now under active investigation. It appears that it may be licked by higher vacuum and heavier plate, since the rust is a result of oxidation. Or an all-covering inside enamel may be especially set up for the application.

End (Resume reading on page 88)

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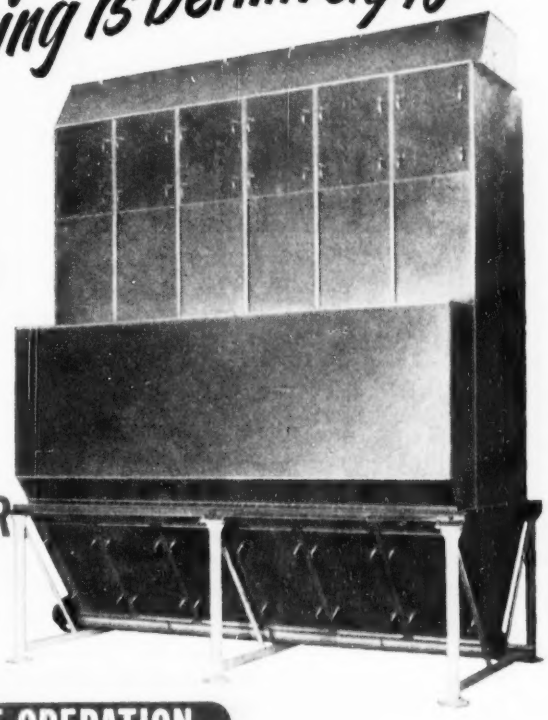

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INSIDE SCIENCE

The Vital Story of MACARONI* ENRICHMENT

by Science Writer

This is the fourth article in a series devoted to the story of cereal enrichment

Dramatic results have been recorded about the value of enrichment in improving health. From the United States, the Bataan peninsula in the Philippines, Newfoundland and many other parts of the world comes word of the great benefits which result from enrichment.

For years, some forward-looking manufacturers of macaroni and noodle products have used enrichment to make their good foods better. They know that enrichment restores important vitamin and mineral values which are unavoidably lost in milling, and they recognize their responsibility to provide the greatest health-building benefits for the public.

Enrichment is really a simple process. It adds the following essential elements to the food during manufacture.

Thiamine—also called vitamin B_1. This vitamin helps to build physical and mental health. It is essential for normal appetite, intestinal activity and sound nerves.

Riboflavin—also called vitamin B_2. This vitamin helps to keep body tissues healthy and to maintain proper function of the eyes. It is essential for growth.

Niacin—another "B" vitamin, is needed for healthy body tissues. Its use in the American diet has done much to make a serious disease called pellagra disappear.

Iron—is a mineral used in all enrichment. It is essential for making good, red blood and preventing nutritional anemia.

Products made from semolina may be enriched by two methods. One uses small square wafers which contain all the vitamins and iron necessary to enrich 100 lbs. The wafers break up in a small amount of water which is then added to the paste. For manufacturers who use the continuous press method, a powdered concentrate of the vitamins and iron, called a premix, is available. This is added by a mechanical feeding device.

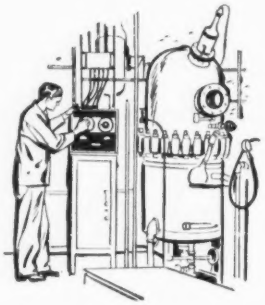
*Macaroni is used here in the generic sense. It includes all alimentary pastes: macaroni, spaghetti, pastina, noodles.

These are the minimum and maximum levels, in milligrams per pound, required by the Federal Definitions and Standards of Identity for enriched alimentary pastes.

	Min.	*Max.*
Thiamine (vitamin B_1)	4.0	5.0
Riboflavin (vitamin B_2)	1.7	2.2
Niacin	27.0	34.0
Iron	13.0	16.5

NOTE: These levels allow for 30% to 50% losses in kitchen procedures.

Nowadays scientists are able to "build" duplicates of many of Nature's essential complexes in the laboratory. This has happened with many vitamins. First the chemical composition is learned and the pure substance is isolated. Then a "duplicate" is made which is identical chemically and biologically with Nature's product. A vitamin is a vitamin regardless of its source just as salt is salt whether it comes from a mine or is evaporated from the sea. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.



The Hoffmann-La Roche people, who produce a good percent of the vitamins used in enrichment, use amazingly complex processes with scientific production controls. This requires modern, special equipment filling whole buildings, each one a city block square and many stories high.

The combination of scientific research, thorough know-how and mammoth manufacturing processes—plus the far-sightedness of leaders in the macaroni industry—is helping vitally to make good macaroni products better.

This article, reprints of which are available without charge, is published as a service to the macaroni industry by the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West, Montreal, Quebec.

ADVANCES IN TECHNOLOGY

Susceptibility to Oxidized Flavor Development Is Influenced by Hydrolysis of Milk Protein

In an attempt to determine influence of protein hydrolysis on oxidized flavor development in milk, experiments were conducted with three pancreatic enzymes.

Samples of fresh raw cow's milk were divided into portions. One served as control, the others received enzyme treatments—crystalline trypsin (4 mg./1.); Lactivase (60 mg./1.), or T-360 trypsin (20 mg./1.) plus incubation at 104 F. for 20 min. followed by in-bottle pasteurization at 145 F.

Susceptibility to oxidized flavor development was determined by dividing each sample into 6 portions, adding sufficient $CuSO_4$ solution to give desired Cu concentrations, and storing at 32-40 F. After 48 hr. portions were examined to ascertain minimum concentration Cu required to produce off-flavor. All enzyme treatments were effective in protecting flavor of samples.

Non-protein nitrogen tests, made on controls and enzyme-treated samples, indicated that decrease in susceptibility to oxidized flavor in: (1) Crystalline trypsin treated milk was due entirely to hydrolysis, and (2) Lactivase or T-136 trypsin treated milk was not entirely due to this cause.

Digest from "Influence of Protein Hydrolysis on the Susceptibility of Milk to Oxidized Flavor Development," by T. L. Forster, C. Jensen and E. Plath, *Journal of Dairy Science*, 98-102, Feb. 1953.

Modified Babcock Test

Fat content of milk may be determined more accurately with minimum of skill on part of operator by modified Babcock test. It differs from regular Babcock test in that a quaternary solution is added to H_2SO_4, and glymol is used to remove meniscus in fat column.

Acid is standardized to 1.82 sp. gr. at 68 F., then to each liter is added 9g. 50 percent alkyl dimethyl benzyl ammonium chloride.

Regular Babcock equipment and procedures are used—17-18 ml. special acid are added to 18g. sample of milk, followed by centrifuging etc. When test is completed bottles are placed in 135-40 F. water bath for 5 min. Then few drops of glymol are added and fat column is read to $\frac{1}{10}$ of 1 percent.

Results average about 0.03 percent lower than ether-extraction procedure, a difference less than with regular method.

Digest from "A Modification of the Babcock Test Employing a Quaternary Ammonium Compound," by H. L. Wildasin, E. O. Anderson and D. E. Watts, *Journal of Dairy Science*, 87-92, Feb. 1953.

Apparatus For Making Ice Cream Sandwiches

Apparatus has been patented for making ice cream sandwiches without handling except for placing wafers in mold. Apparatus is essentially a pan, in bottom of which is a series of rectangular openings with a molding compartment suitably secured to each. Compartments are adapted to receive a pair of wafers in spaced relation to each other.

Lower part of compartment is provided with a cup-like resilient member of rubber or similar material which permits ejection of finished sandwich by applying pressure and partly collapsing cup. Pan may be provided with any suitable number of compartments.

After wafers are placed, a filling tray is inserted, having openings in bottom coincident with openings in molding apparatus. Fluid or semi-fluid ice cream is poured into filling tray and flows into compartments between spaced wafers. Filling tray may then be removed from mold, and contents of latter can be refrigerated in any desired manner, as by passing mold through a tank of brine. Mold is then inverted and sandwiches ejected by application of pressure to resilient cups.

Digest from U. S. Patent 2,619,046, issued Nov. 25, 1952, on application dated March 14, 1950, to P. I. Henderson, Charlotte, N. C.

Speeds Coliform Counts

Use of membrane-filter method for determination of coliform organisms in pasteurized or certified milk permits a more rapid counting of colonies with elimination of much plating procedure.

The membrane filter is a very thin, uniform colloidal cellulose or cellulose ester derivative with pores 1.5-0.5 microns wide. For use it must be boiled in distilled water for 20 min. to remove air contained in the pores and adequate sterilize it. Membrane is then placed in bacteria filter apparatus.

Milk sample is warmed to 104 F. placed in sterile bottle and centrifuged for 10 min. at 2,000-2,500 rpm. Liquid is removed, 50 ml. distilled sterile water added to sediment followed by vigorous shaking and centrifuging. Water layer is removed, then sediment is dissolved in 100 ml. sterile distilled water and transferred to vacuum filter. When filtration is finished, membrane is removed, its bottom dried carefully over a hot plate, then it is placed on a previously prepared agar plate. An additional 4 ml. agar is poured over surface of membrane.

After 24 hr. incubation at 98 F. colonies are counted. Best results were obtained with Endo-agar in which coliform cultures appear deep red, while other organisms are white. Membranes may be dried and preserved.

Digest from "Membrane Filter Method for Determination of Coliforms in Pasteurized and Certified Milk," by R. Ehrlich, *Journal of Milk & Food Technology*, 6-8, Jan.-Feb. 1953.

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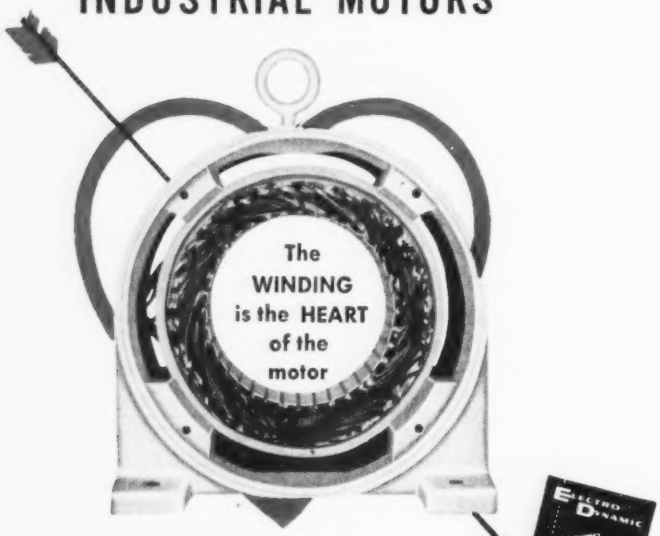

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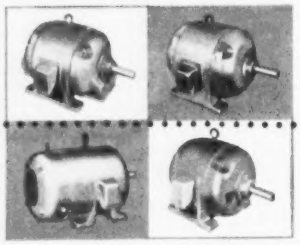

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BAKING

Modified Skim Milk Powder Gives Good Loaf Volume

Improved baking qualities are said to result from a modified dry skim milk now produced in Australia. In its manufacture, skim milk is given a severe preheating, then small amounts of potassium bromate, glycerol monostearate, and fully hydrogenated, high-melting fats are added followed by drying.

Recommended quantities of additives to 100 gal. skim milk (or its equivalent to concentrate) are: Hydrogenated stearin, 4 lb.; GMS, 1 lb., $KBrO_3$, 9½g. Stearin and GMS are emulsified by means of live steam in ½-1 gal. hot water then cooled to 120 F. $KBrO_3$ is dissolved in ½ pt. water.

Skim is preheated to 185-90 F. for 30 min., then concentrated. Additives are incorporated with agitation, followed by roller drying. For spray drying, an improved product results from substitution of 5 lb. GMS for above stearate mixture. This product cannot be handled successfully on roll dryer.

Powder is said to possess approximately same keeping qualities as ordinary dried skim milk. When used in doughs in amounts up to 6 percent excellent loaf volume and quality results.

Digest from "Skim Milk Powder for Use in Australian Bread," by J. W. Lee, *The Australian Journal of Dairy Technology*, 118-25, Oct.-Dec. 1952.

Study Chlorine Dioxide As Flour Improver

Although chlorine dioxide has replaced Agene in the United States as the more common flour improver, British scientists are supplementing original biological tests with chemical studies of interaction of ClO_2 with flour and fractions derived from it. Lipoids, tocopherols, and proteins were investigated.

Lipoids of flour interact freely with ClO_2 and with Cl. With pure ClO_2, unsaturated fatty acids are initial sites of an oxidative process that seems to include a degree of polymerization. Iodine number of fat from 81 percent extraction flour is about 112, whereas that from similar flour treated with ClO_2, at 10 times commercial level, is about 103. If a solution of this treated fat is held at room temperature, there is a slow deposition of a rubber-like polymer. Oxidation of lipoids by ClO_2 or air might be an important primary step in a sequence of oxidative changes affecting other flour constituents.

In view of oxidative effect of ClO_2 on fat, and sensitivity of this fat-solu-

ble vitamin to oxidation, tests were made on stability of tocopherols in flour to treatment with ClO_2. These were made on the flour stream (rich in wheat germ) from a commercial mill before and after treatment. Tocopherol content of treated flour was reduced by about 70 percent compared with the untreated. Nature of oxidative products has not been studied.

Interaction of proteins with ClO_2 was studied by examining hydrolysates from different types of proteins. In addition to comparing fractions from treated flour with similar fractions from untreated product, fractions were isolated and treated direct with ClO_2. Amino acid residues which are attacked, in a variety of protein fractions, and which give ninhydrin-positive modifications stable to total acid hydrolysis, are methionine, cysteine, and tyrosine. If pure ClO_2 is used, oxidation reactions predominate, with formation of cysteic acid and oxides of methionine. If free Cl is present, halogenation occurs with formation of monochlor- and dichlortyrosine. The agene toxic factor, methionine sulphoximine, was not found in any of the protein fractions treated with ClO_2, or derived from treated flour. The production of modified amino acids observed is so small that the reduction in the content of the parent amino acids is negligible; nor are they likely to induce toxic symptoms.

Digest from "Interaction of Chlorine Dioxide With Flour," by T. Moran, J. Pace, and E. E. McDermott, *Food Manufacture*, (Pub. 9 Eden St., London) 28, 103-106, March, 1953.

MEATS

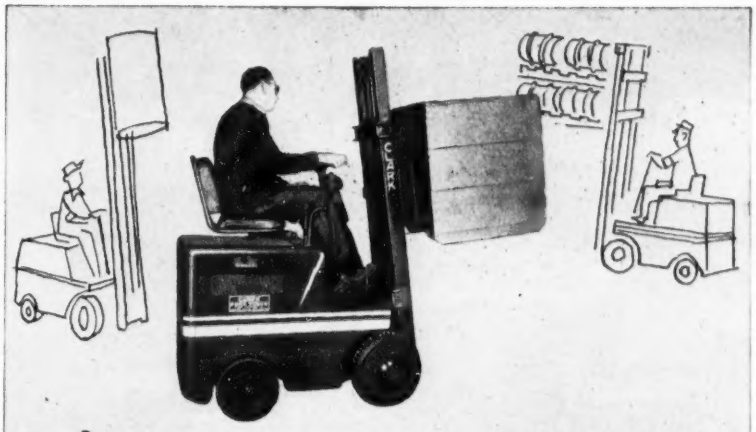
Effect of Quantity of Nitrite On Canned Meat Quality

Optimum concentration of sodium nitrite to be included in mixed ingredients for production of canned, cured meat loaf containing approximately 82 percent uncured beef should be 50-100 ppm.

This should be dissolved in water to enable its uniform distribution—in meat loaf and meat paste mixtures, solution can be added to cereal components, in non-cereal mixtures, solution can be sprayed on pieces of meat.

Above conclusions are based on studies of abnormalities in color, odor, flavor, texture and gas production in meat-loaf type packs. Usual methods for production of packs was to mix meat (cut in small pieces) and other ingredients in various types of mechanical mixers, then fill into cans and cook under pressure.

Desirable reddish-pink color of cooked cured meat was fully developed, in experimental packs, at 25



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ppm. $NaNO_2$, and changed to progressively less desirable colors as concentrations exceeded 150 ppm.

Abnormalities in texture could not be detected until concentration of $NaNO_2$ exceeded 1,000 ppm. And typical cured meat odor was not developed below 50 ppm. $NaNO_2$. Above 150 ppm. off-odors, resembling nitrogen peroxide, developed.

Best flavor developed between 50 and 100 ppm. $NaNO_2$, and no increase of N in headspace was observed until a concentration of 450 ppm. $NaNO_2$ was used.

Digest from "Notes on the Influence of Nitrite on the Quality of Canned Cured Meats," by W. A. Empey, *Food Preservation Quarterly*, (Pub. by Div. of Food Preservation & Transport, Homebush, New So. Wales, Australia), 39-45, Nov. 1952.

SUGARS

Juice From Sugar Beets By Explosion Process

Production of sugar from beets by process that uses more compact, less costly equipment than diffusion process is reported.

Process is based on treating beet cossettes with steam under pressure followed by a sudden reduction of pressure to rupture cells.

Cossettes are placed in a vessel and exposed to steam at 60 psi. for a few seconds. Then pressure is released and cossettes are blown out of a nozzle and against a baffle. This disintegrates beet cells and permits easy separation of juice from solid constituents.

Juice can then be limed, carbonated, and concentrated to produce sugar according to usual method.

Digest from "A New Explosion Process for Recovering Sugar From Sugar Beets," by L. E. Brownell and S. A. Zieminski, paper presented at ACS meeting, Los Angeles, March 19, 1953.

Glucose From Algae

Laminarin is a glucose polysaccharide occurring in certain brown marine algae. It is made up of chains of about 20 glucose units joined by β-1,3-linkages, rather than by the α-1,4-linkages that occur in starch.

Since large-scale production of glucose (sugar) from this marine glucan obtainable from *Laminaria cloustoni* or *Laminaria digitata* is possible, conditions for its hydrolysis and conversion to the sugar have been worked out.

Hydrolysis occurs when laminarin is heated for one hour at 275 F. in 0.05 N HCl.

Hydrolyzate may be treated with ion-exchange resins and decolorized

(*Turn to page 162*)

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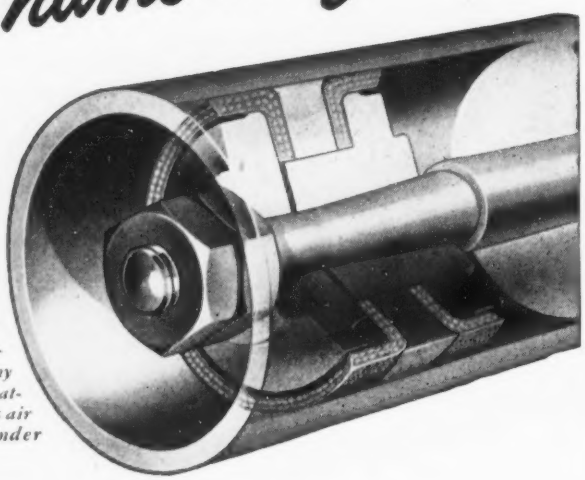

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Digest from "Manufacture of Algal Chemicals. V. Laboratory-Scale Isolation of D-Glucose from Laminarin," by W. A. P. Black, E. T. Dewar, and F. N. Woodward, *Journal of Science of Food & Agriculture*, 58-64, Jan. 1953.

CEREAL PRODUCTS

Thermal Properties of Wheat Influenced By Moisture

By measurements made in a cylindrical container with heating element along the axis, it was found that dry wheat has a thermal conductivity of 0.00030 cal./sq. cm./sec./deg. C./cm.; a specific heat at 0 C. of 0.31 cal./g./deg. C.; a thermal diffusivity of 0.0012 sq. cm./sec. All three properties show small varietal differences.

Thermal conductivity increases linearly with moisture content at approximately 0.000007 cal./sq. cm./sec./deg. C./cm. for every 1 percent dry weight increase in moisture content. Thermal diffusivity (thermal conductivity/specific heat × bulk density) decreases with increasing moisture, and hence specific heat increases as the moisture goes up. Wheat of 13.7 percent moisture (as is basis) had a specific heat of 0.460; the same wheat at 5.3 percent moisture had a specific heat of 0.357.

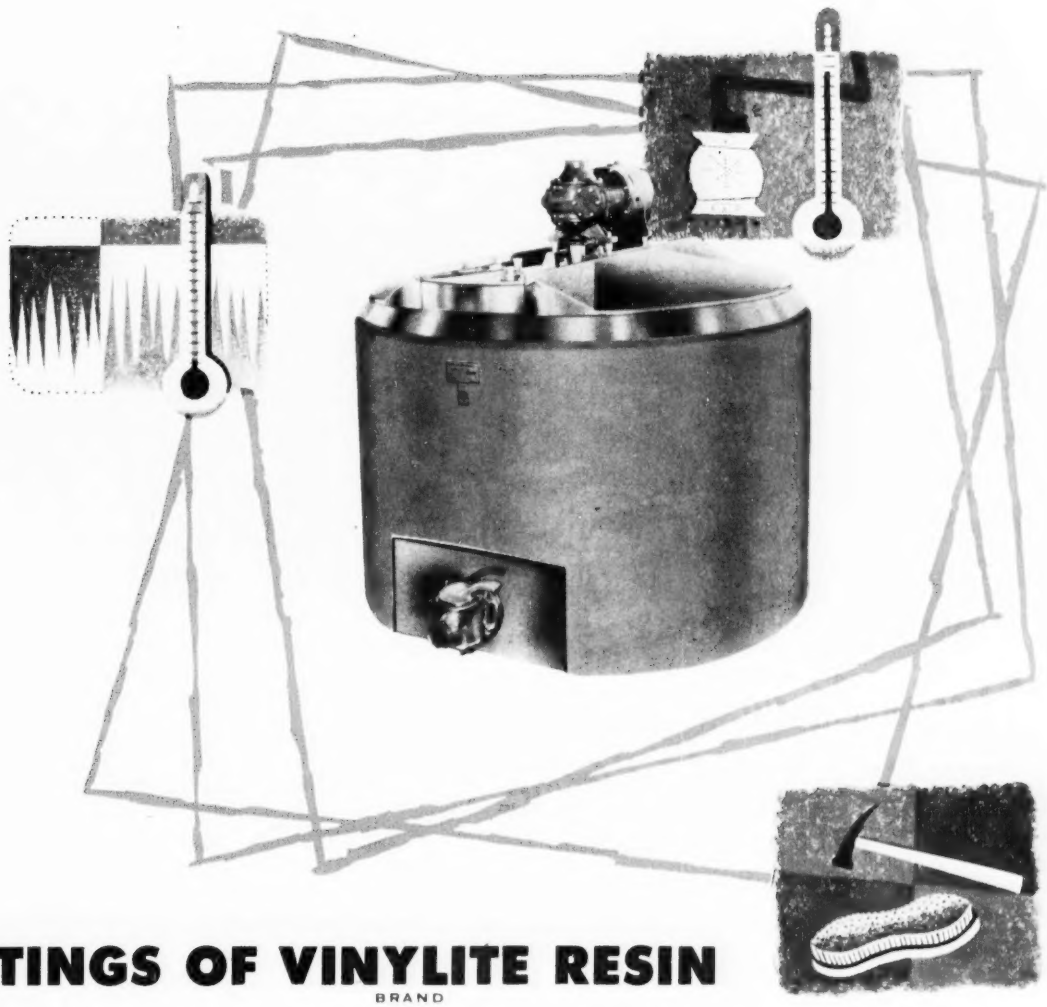
Digest from "The Effect of Moisture on the Thermal Properties of Wheat" by Irene Moote, *Canadian Journal of Technology*, 31, 2 & 3, 57-69, 1953.

Drying Cereal Grains

Combine harvesting of grains in some countries has resulted in threshed cereals with moisture contents too high for safe storage. In the United Kingdom limit of moisture for safe storage is set at 14 percent for bulk and 14-16 percent for sacks, if storage is to continue for longer than one month.

This has necessitated drying of grain on farms either in bins or sacks. Bin drying requires a false perforated floor and air 75-120 F. delivered at 10-15 cu. ft. per min. Maximum temperature of air for such drying is 180F. for feeding grains, 150 for wheat that is to be milled, and 110-120 for barley or seed grains.

Grain in sacks can be dried on platforms over a duct carrying heated air. Each sack completely covers the heavy wire grill on which it rests so



COATINGS OF VINYLITE RESIN BRAND

with the give that can take it!

FLEXIBILITY is a must when formulating coatings for milk processors and other equipment subject to rapid heating and quick cooling.

Such frequent temperature changes are rough on ordinary paints. However, coatings based on VINYLITE Brand Resins just move with the metal, expanding and contracting the amount needed . . . adhering tenaciously to the surfaces.

Moreover, they are highly wear-resistant, and can take the constant washing and scrubbing required in food plants, and the scuffs and bumps of people, tools and equipment. VINYLITE Resin coatings are highly chemical-resistant . . . unaffected by most detergents, chlorine solutions, acids and alkalies. And, they can be colored to practically any shade or deep tone desired for product identification or equipment coding.

No matter what you coat—dairy equipment, tank cars, oil refineries, marine installations, chemical plants—VINYLITE Resin coatings bring outstanding results wherever surfaces are exposed to rough treatment, chemicals, salt water, industrial gases. Properly applied, they stay put on metal, concrete, masonry without cracking, chipping, peeling or fading.

You can improve performance as well as cut costs by using coatings based on one of the many BAKELITE or VINYLITE Resins. Write Dept. QG-74 for folder giving case histories of severe coating applications.

Vinylite BRAND

RESINS

TRADE MARK

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Photo shows milk plant equipment made by Cherry-Burrell Corporation, Chicago 6, Ill., and coated with VINYLITE Resin coatings in Cherry-Burrell Blue. Coatings were prepared by Stoner-Mudge, Inc., Pittsburgh 33, Pa.

For more information, use coupon on page 159.

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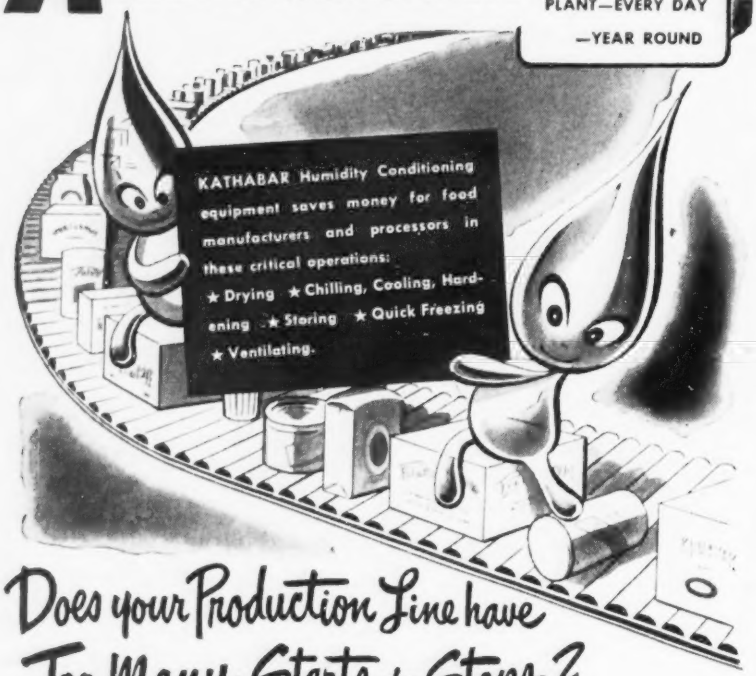
KATHABAR Humidity Conditioning equipment saves money for food manufacturers and processors in these critical operations:
★ Drying ★ Chilling, Cooling, Hardening ★ Storing ★ Quick Freezing ★ Ventilating.

Does your Production Line have Too Many Starts & Stops?

Some typical applications where Kathabar Humidity Conditioning has permitted *continuous* operations in the food industry are: ★ Bakery product drying ★ Gelatin drying ★ Sugar cooling after refining ★ Sugar-coated breakfast food manufacture ★ Candy cooling with sub-freezing air ★ Coffee, chewing gum, and grain products manufacture.

For cost-minded executives: In many cases, Kathabar equipment has paid for itself in the first year.

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that air must pass through. Air temperatures are about 25 deg. above ambient. Sacks should be loosely filled and preferably of coarse mesh. Such driers hold 20-128 bags, require little attention. Bags may remain on them for 24 or more hours. Because supervision is not necessary and the heated air produced is very clean, electrical heating is ideal.

Digest from "Grain Drying by Electricity," by W. Cover, *Brewers' Guild Journal*, 21-27, Jan. 1953.

FRUITS & VEGETABLES

Concentrating to Six-Fold Improves Orange Juice

Orange concentrates of high density (6-fold or more) having flavor stability equal to 4-fold commercial samples can be made by adding a small amount of orange oil instead of cutback juice.

Such concentrates are more fluid at usual frozen storage temperatures and, therefore, more easily reconstituted. Also, cloud stability is equal to that obtained by stabilizing 4-fold product by partial heat treatment.

In procedure, juice is concentrated to 58 Brix, or higher, then proper amount of oil is added to restore flavor lost during evaporation.

Digest from "Flavor Fortified High Density Frozen Citrus Concentrates," by R. G. Rice, G. J. Keller, R. J. McColloch and E. A. Beavens, paper presented at ACS meeting, Los Angeles, March 18, 1953.

Solution Prevents Darkening Of Peeled White Potatoes

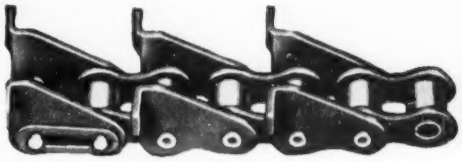
When peeled white potatoes are treated with a solution of sodium sulphite and citric acid they are protected against discoloration and may be marketed in moisture-proof brown paper bags.

This patented process overcomes objections to other treatments in that SO_2 does not form a hard coating on potatoes, and they need not be packaged in sealed containers.

Treating solution is made by mixing 1 lb. Na_2S and ½ lb. citric acid crystals in 30 gal. 40 F. water. Reaction liberates available SO_2 with formation of sodium citrate that ultimately appears as a white crystalline salt on treated potatoes.

In accordance with invention, freshly peeled potatoes are placed in white cotton bags and immersed in solution for 1 min., after which they are drained and examined for blemishes. They are returned to bags and then given another 1-min. treatment. Treated potatoes are then stored in

HELP



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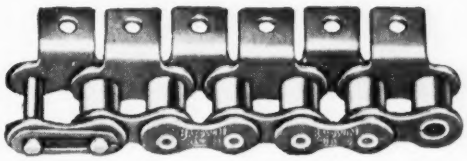

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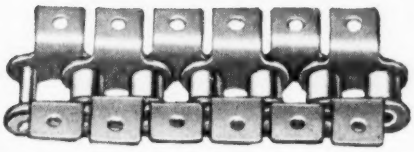

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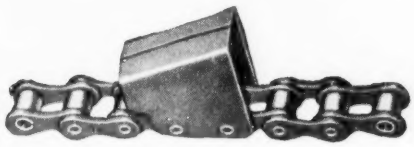

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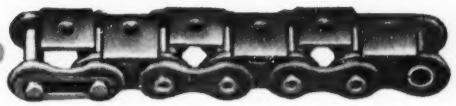

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When selecting chain attachments, it is important that you select the attachment that is *exactly* right for your conveyor. Only then are you sure of getting maximum efficiency from your operations. That's why it's always a good idea to call in your Baldwin-Rex Field Sales Engineer for help when you're selecting chains and attachments. His specialized knowledge can prove extremely valuable to you. For the complete story, send today for our Bulletin 50-35 on "Chains and Attachments for Low-Cost Conveying." Chain Belt Company, 4783 W. Greenfield Ave., Milwaukee 1, Wis.

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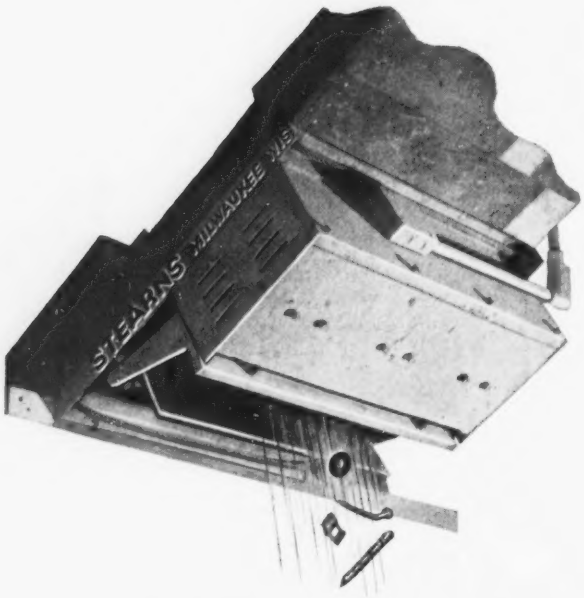

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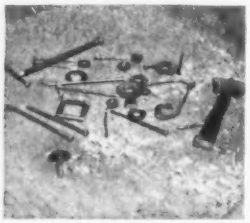

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In Keeping Up With Field . . . . page 199

crates or baskets at 40 F. As desired they may be removed from storage and marketed in brown paper bags.

Digest from U. S. Patent 2,620,277, issued Dec. 2, 1952, on application dated Feb. 25, 1949, to Corrado Scalera, Providence, R. I., assignor of one-half to Anthony Longo, Cranston, R. I.

MISCELLANEOUS

Lactic Bacteria Evaluated

Lactic acid bacteria are both useful and detrimental to the food industries. But whether homofermentative (producing lactic acid only from sugar) or heterofermentative (producing lactic and acetic acids as well as alcohol, carbon dioxide and other substances), all are included in the family Lactobacteriaceae. They can be distributed among the five genera, *Streptococcus, Diploccoccus, Leuconostoc, Pediococcus,* and *Lactobacillus.*

In addition to sugar and a source of nitrogen, most of them require vitamins and growth factors for their metabolism. Demands for these are the basis of their use in the assay of foods for amino acids and vitamins. Some also require nucleic acid derivatives such as adenine and thymine, as well as fatty acids and relatively large amounts of K, Mn, and P.

When nutritional requirements are met, microbiological assays of foodstuffs using these bacteria have a precision of ±15 percent, and limits of ±5 percent may be reached with several of the amino acid assay methods.

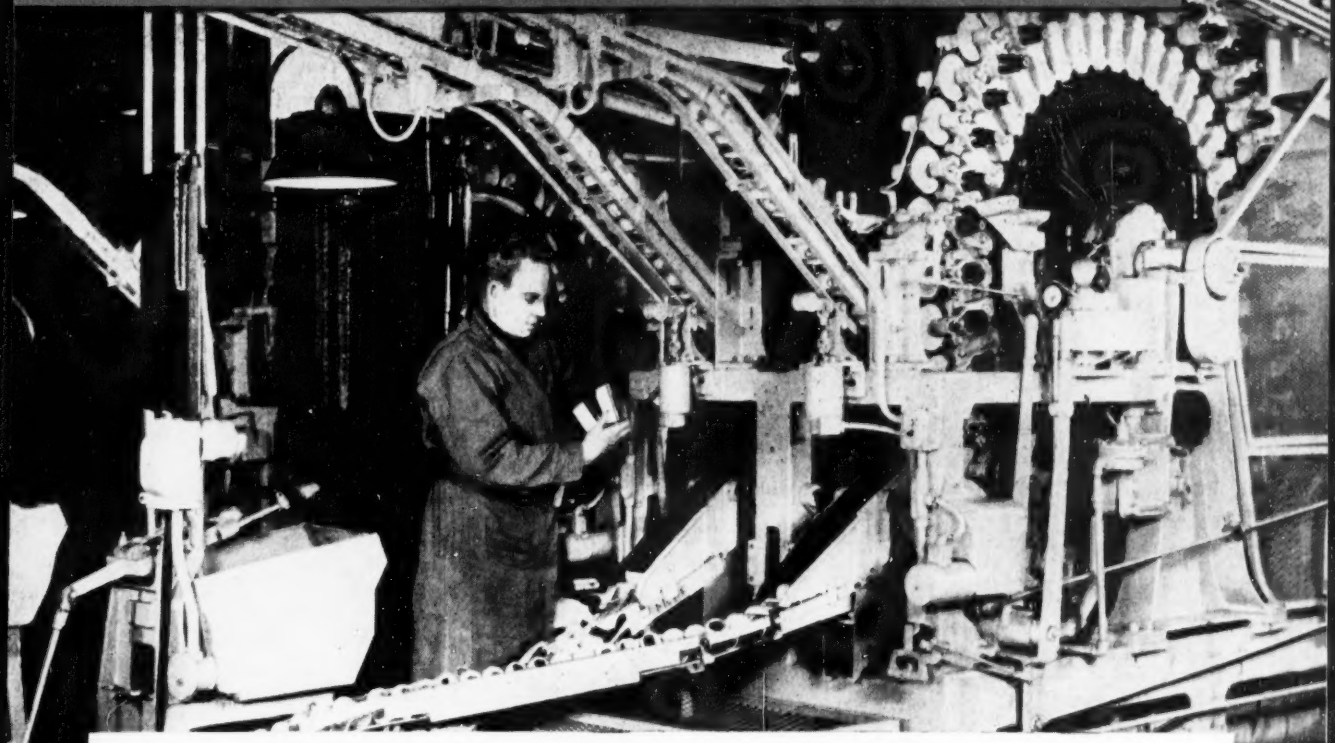
In addition to the desirable lactic fermentations of dairy products, certain types of sausages, sour breads, sauerkraut, and sour-mash whiskey fermentations, undesirable lactic fermentations also occur. Frozen orange juice may acquire a buttermilk flavor due to diacetyl formation, a compound which also contributes to the honey-like flavor of beer afflicted with "sarcina" sickness (due to *Pediococcus cerevisiae* or *Streptococcus damnosus*).

Some wine diseases are also due to lactic acid bacteria, and turbidities in vinegar-packed foods, meat spoilages, and the slimy *Leuconostoc* fermentations of sugar factories are other undesirable activities of these bacteria.

Digest from "Symposium on the Lactic Acid Bacteria" by R. P. Tittsler, C. S. Pederson, E. E. Snell, D. Hendlin, and C. F. Niven Jr., *Bacteriological Reviews,* 227-60, Dec. 1952.

IN THE FOOD INDUSTRY

There's more to CORROSION than meets the eye



Sometimes VISIBLE...Often HIDDEN...Corrosion Strikes in Every Plant

This year, the Food Industry will pay millions of dollars for needless losses created by corrosion ...*yet much of this corrosion may never be discovered* until it's too late to protect—and time to pay!

Even though rust is seldom visible in well kept, modern plants, corrosion is sure to be present. And, by far, the major costs of corrosion come from hidden areas—where only minute inspections and constant care can prevent costly failures.

YOU LOSE IN A "WAITING GAME"

Don't wait for rust or other visible signs to appear. Visible or hidden, corrosion will destroy costly equipment... halt production... cause unnecessary maintenance shutdowns... and make plant clean-up more difficult. Thus corrosion dips deep into your profits as it creates needless losses totaling thousands of dollars.

YOU CAN PREVENT NEEDLESS WASTE

Check your plant for corrosion's presence. Double-check areas that may be vulnerable to *hidden corrosion*. If you would like help, an AMERCOAT Field Engineer will gladly assist you in making a thorough analysis. There is no obligation.

What is AMERCOAT?

AMERCOAT is a method of corrosion control. Not just a single product, but a complete LINE of coatings, individually formulated to solve or control specific industrial corrosion problems.

FOLLOW THE LINE OF *most* RESISTANCE... PROTECT WITH *Amercoat!*

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STANDARD-IZED DRYING – since 1926!

▲ Latest Standard Dryer, installed at West End Aug. '52.

Air view of West End Chemical Co. buildings. Annual production capacity is 200,000 tons of soda products and borates. ▶

27 of the 28 Dryers used by WEST END CHEMICAL COMPANY are STANDARD-HERSEY

To tap the fabulous sub-strata chemical resources of Searles Lake in California's Mojave Desert, it was necessary for the West End Chemical Company in 1926 to bring in special custom-made machinery and set up a plant at the source of the raw product. The machinery had to be rugged and dependable because repairs and replacement facilities were many long desert miles away.

Vital to the West End process of manufacturing borates and soda products is the use of rotary dryers. Their first dryer in 1926 was a STANDARD-HERSEY. With modifications, that dryer is still in use today. Since then, West End has purchased 26 additional STANDARD-HERSEY rotary dryers.

This case history is convincing proof of the dependability of STANDARD-HERSEY Dryers. Now celebrating its 50th year, *Standard Steel Corporation* manufactures more than 30 separate types of dryers for process industries throughout the world. Special equipment can be engineered to fill special drying requirements.

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STANDARD STEEL CORPORATION

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Mars Revolutionizes Process

—*Continued from page 60*

Varying this setting increases or decreases the voltage to the A.C. driving motor in the frequency changer which, in turn, reciprocally changes line motor speeds.

A boldly calibrated indicating-and-recording tachometer across the belt from this speed control station advises line speed in feet per minute. The line foreman consults this indicator when "pacing" the line to any change in product or factory conditions.

Mounted adjacent to the line tachometer are similar bold-dial indicating-and-recording temperature controllers that permit quick visual check of the product temperature from the two cooling sections. And above the three instruments is an indicating counter that tabs the number of strokes of the cutting knife assembly.

Five emergency pushbutton stations at vital points along the line can stop operations. However, line start-up can only be initiated at the "master control" station at the slicer.

Gaging the Product

While this master control panel provided the foreman with complete and effective control of line dynamics, it was early discovered that the speed of product past the station made spot-checking almost useless as a basis for control.

What was needed was an equally dynamic and continuous measurement that would signal—and ultimately control—product trends as *they occurred*.

By far the most critical factor was the height of the bar itself. This could vary due to any number of causes. Such "straying"—when added up in thousands of bars—was a matter of considerable economics.

It was thus desired to measure sheet height continuously in process. Accordingly a Teflon-bottomed shoe was devised to ride on the sheet lightly without sticking. The position of this shoe was then conveyed through a suspending rod and rotary shaft to the slider of a small potentiometer located at the side of the belt. Output from this "pot" was then fed into the bridge circuit of a strip chart electronic recorder for a continuous measurement.

In refining this measuring system, it was discovered that a similar shoe was needed to ride on the undersurface of the belt to compensate for belt variations and other movement. This motion was simply electrically subtracted from the sheet-riding unit.

To scan adequately the 23¼ in.-

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If you have a food processing problem requiring uniform feeding and control — automatically by weight — communicate today with Wallace & Tiernan. Your inquiry will receive prompt attention without obligation.

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wide moving sheet, it was decided to use three parallel shoes both above and below the belt and to employ a fast printing multiple recorder. Parallel rotary shafts above and below were used to transmit height measurements to a single dust-proof cabinet housing the "pots".

Since height pick-up stations were desired at the exits to the nougat and finished sheet coolers, a single six-record strip chart recorder was set up for each line. The chart was divided into six sections with 20 line calibrations to print segregated records of the six measuring points, with each section equalling .005 in. movement. Chart speed was set at 20 in. per hour and printing speed at 3 sec.

Hairline Control

Let us check over what this "dimensiometer" gives us. The smallest detectable change in sheet height—magnified by a 10-to-1 ratio in the pick-up pivot system—is approximately .003 in. And this equals about ½ in. of movement on the instrument chart. Thus any variations beyond this are almost dramatically spotted by a jog in the instrument record.

More intriguing, this sensitive instrument has been found to offer a revealing analysis of conditions throughout the process. For example, viscosity or ingredient temperature variation can be immediately spotted by characteristic chart record.

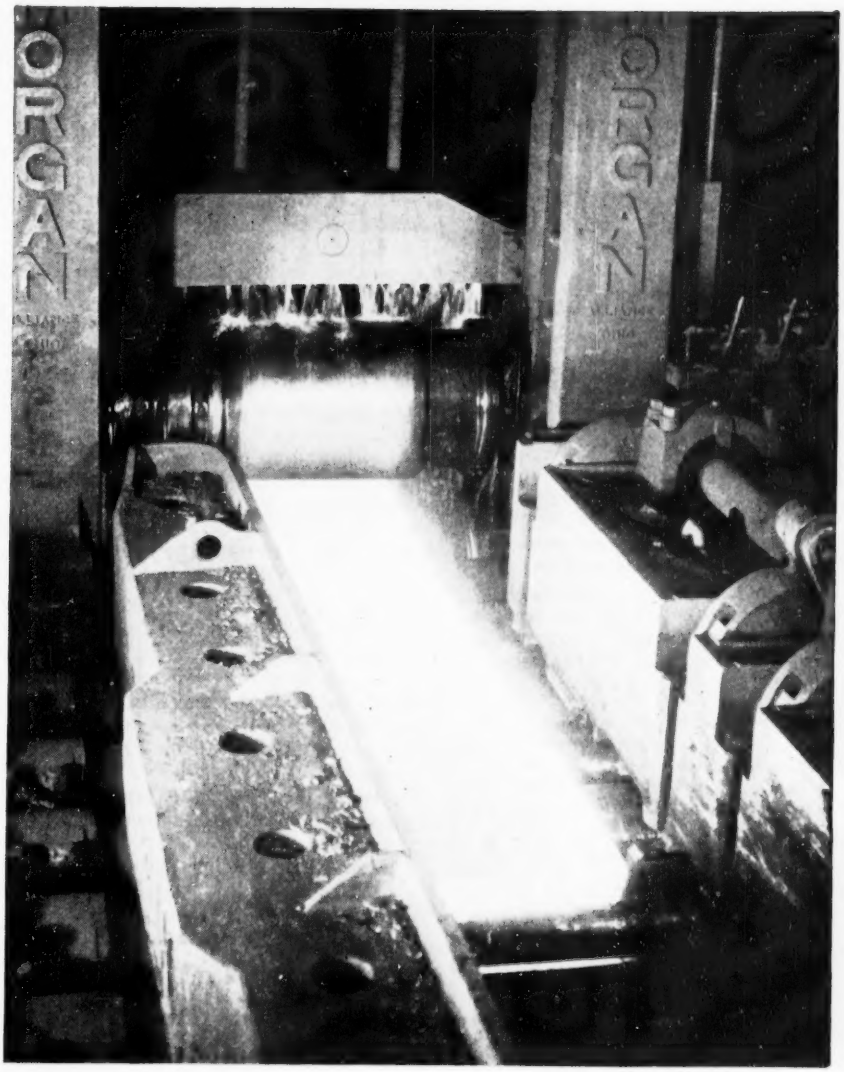
As a matter of fact, this special instrument offers so many possibilities that its function as a "master" controller of the complete line is being closely studied with the idea that its dictates will be carried out by a series of servomechanisms rather than the relatively slow manual chain-of-events now in force.

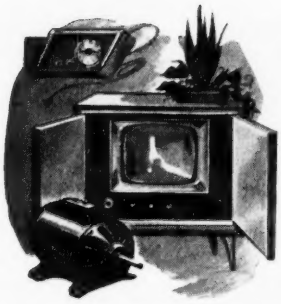
However, this complete automatizing of the Mars candy process will undoubtedly have to wait for one more very important development in the company's projected plans. That will be the ultimate elimination of batch procedures in the cooking phase of operations.

For while the operations are highly mechanized at present—see the fold-out flowsheet for details—it is believed that the benefits from a continuous cook system will be as spectacular as gains from the bar-forming line itself.

And one thing is certain: As the company proceeds in its pioneer path it is bringing candy making far away from its age-old kitchen phase and inaugurating true factory techniques that compare favorably with the best developed by our leading industrial giants.

End (*Resume reading on page 61*)





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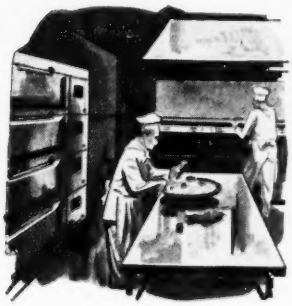

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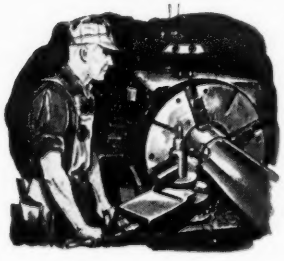

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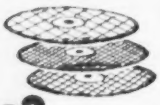
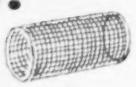


filter leaves?



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Questions & Answers

THIS MONTH'S PROBLEM

Question—We wish to bleach and clean the outer shell of raw peanuts prior to roasting. Can you suggest what bleaching agent is suitable for this purpose, keeping in mind that the roasted peanuts are edible.

Answer to March Problem

The Question Was—How can we remove lumps of clay from dry shelled beans without using water. We found that these lumps cannot be removed by screening because of their size. Also, specific gravity of both are almost similar, so gravity-separation methods cannot be readily employed.

Answer—Now on the market is a bean cleaner, which will adequately perform separation required. In addition to several sets of easily changeable screens for trash removal, unit is equipped with rotary brushes which break up clay lumps without damaging beans.

Broken up clay particles fall through screens, and a built-in suction fan draws off debris.

Cleaner of this type operates at a high capacity, and requires relatively little attention once it has been set up for a specific variety of beans. Machine does, however, take up considerable space, and may require an elevating feeder as an auxiliary unit.

Icing Fades and Cracks

Question—We would appreciate your suggestions in helping us overcome a cake-icing problem. After removing cakes from cold storage (usually after three weeks), chocolate-fudge icing begins to fade and crack. When these cakes are held under normal room temperature conditions, icing retains its smooth gloss and does not crack. Here's formula we use in preparation of the chocolate-fudge icing: Fudge base, 15 lb.; shortening, 3⅜ lb.; powdered sugar, 80 lb.; boiling water, 6¼ lb.; corn oil, 1 lb.; Brokay drier, ¼ lb.; and vanilla, 2 oz.

Answer—It is difficult to make any suggestions because ingredients used in fudge base are not listed and driers may or may not be suitable for this type of icing. In all probability, fudge base did not contain chocolate, but cocoa powder, to which various fats were substituted for cocoa butter.

We suggest preparing a chocolate icing in this manner: Mix powdered sugar, 50 lb.; Nulomoline (invert sugar), 7½ lb.; butter, 7½ lb.; milk solids (non-fat), 5 lb.; vanilla flavor, ½ lb.; and salt ¼ lb. Now add melted chocolate liquor, 22 lb., and mix slowly. Then introduce, with mixing, boiling water, 6¾ lb.

Apply icing to cakes at 105 deg. F., and cool to 45 deg. F. before putting them into cold storage. To eliminate dullness or bloom and sweating, temper cakes to 45 deg. F. before transferring them from cold storage room to room temperature.—*Oscar L. McGee, Bakery Technician, Nulomoline Div., American Molasses Co., New York.*

Residue-Free Leavening Agent

Question—Have you any information on a commercial chemical leavening agent that will release a gas, leaven a product, and yet leave no residue?

Answer—All chemical leavening, with which we are familiar, is based on evolution of carbon dioxide by reaction of acid agents with sodium bicarbonate or ammonium bicarbonate (in the case of pies and cookies).

Leavening without sodium bicarbonate has been proposed. For example, acetone-dicarboxylic acid will yield a non-residue, leavened product. Use of this chemical is not commercially practical, since we understand that it is too costly for low-cost prepared cake mixes.

Hydrogen peroxide has been proposed. It decomposes into oxygen and water and leaves no residue. It is obtainable in liquid form and, as such, cannot be used in prepared cake mixes. Its bleaching effect must also be considered.

Faced With Filling Problem

Question—We are having difficulty with our peanut butter-filling operation. Peanut butter remains on spouts of filling machine, causing dripping losses and improper fills. We have placed a perforated insert in each spout to reduce the force of peanut butter discharged from the filler. However, more air bubbles are introduced into our product by this method. Can you suggest a method of catching the drippings without interfering with the operations of filling spouts or jar lift? And how can we eliminate the air bubbles?

Answer—Without a sketch or photograph of filler and jars (which would show clearances and available supports

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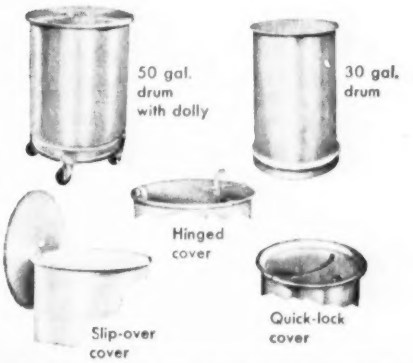
Employes bless the day you give them Wear-Ever aluminum drums to handle. These drums *weigh only* 25½ *lbs.* as compared to others of the same capacity weighing as much as 70 lbs. YOU'LL like the way they save you money—on replacement, as well as initial cost. Wear-Ever drums give long service because they're made of *10-gauge*, extra hard alloy aluminum. Other metal drums usually have thinner, 16-gauge walls.

Wear-Ever aluminum drums are completely sanitary. Their smooth, seamless inside surfaces, rounded corners, and continuous welds where sections join, meet all Government inspections and sanitary codes. They're non-rusting, corrosion resistant, can't splinter. They neither pick up and pass along odors, nor can they affect taste, flavor or color in any way.

Made in both 30 and 50 gallon sizes. Available with slip-over or hinged cover, and dolly. Mail the coupon today.



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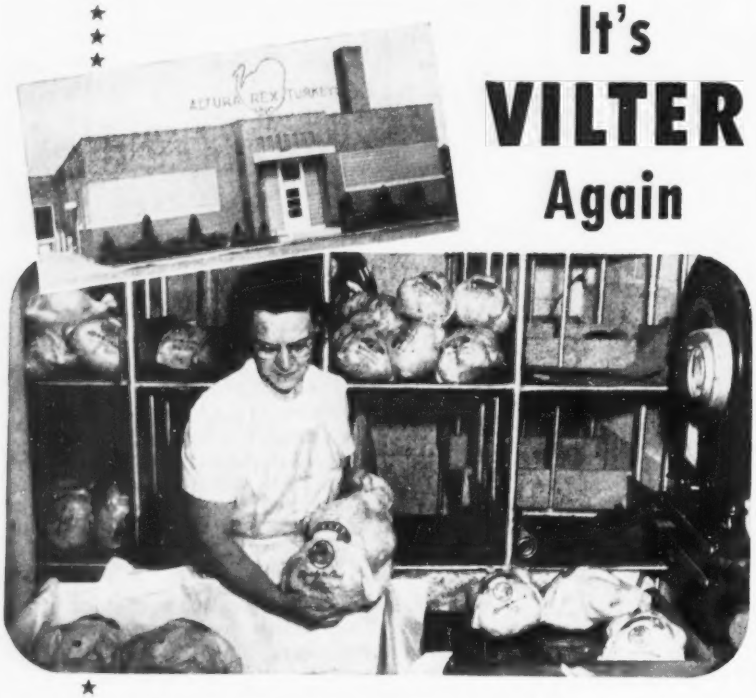
In Processing Turkeys at ALTURA REX...

It's VILTER Again



Over 400,000 turkeys are now eviscerated and frozen every year by Altura Rex, Inc., of Altura, Minnesota. For the past three years, their entire output has been frozen, and as a new feature, all turkeys now bear the Government Seal of Acceptance for Wholesomeness.

Important in the Rex plant are a Vilter Blast Freezing System, and a Vilter PakIcer. PakIce is used for chilling the birds prior to freezing with the Blast Freezer. Altura Rex reports that the Blast Freezer has brought them "shortening of freezing time, improvement in color of the product, and ease of handling." They say further that they have found "PakIce an ideal medium for chilling to the proper temperatures without drying out or weight loss of the product."

Processor after processor has found that a Vilter installation gives him not just refrigeration, but equipment that is *right* for the job, to save time and money and labor in his plant. Years of use have proved over and over that Vilter equipment costs less to operate and maintain, too, so Vilter users enjoy *double* savings.

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for a catch pan), it is difficult to provide a specific solution.

Such a solution, however, does not appear practical for several reasons: (1) A drip pan would require additional cleaning at end of operations, (2) peanut butter may not be completely salvageable, (3) proper fills would not be assured, and (4) an accidentally dislodged pan might cause spillage and breakage of jars.

We believe your difficulty is primarily due to a disparity between product consistency and design of filling spouts. Therefore, a more direct approach would involve changing consistency of peanut butter or the design of the filling spouts.

Apparently you have been working along these lines, only to find that the spout modification has created a new problem—air bubbles in the peanut butter. If your modified spout design has otherwise solved your problem, it would be our suggestion that you take a leaf from the book of chocolate bar manufacturers and install a vibrator underneath the discharge table of filling machine. This unit will shake bubbles to surface prior to capping.

This is a simple, yet effective, way of removing entrapped air, provided product is sufficiently fluid. And we assume that it is since you have a dripping problem.

On the other hand, you may not be satisfied with the modified spout design for other reasons. If so, then we suggest that you cool peanut butter a few degrees below present filling temperature to increase viscosity.

Many piston-type, filling-machine hoppers are jacketed for temperature control. Or they can be equipped with a water jacket without too much difficulty. Perhaps a cooling-water jacket on the pipeline going from grinding mills to filler would be preferable. A

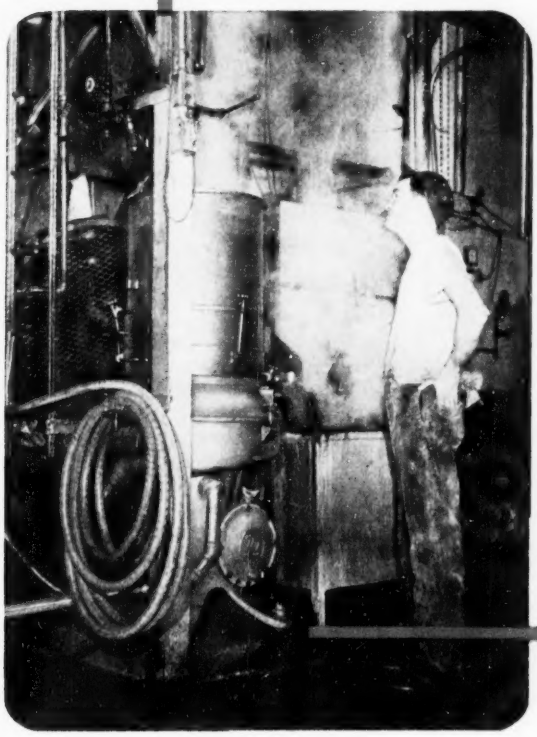
How Would *You* Do It?

Readers are invited to submit to FOOD ENGINEERING answers to questions in this department, especially to "This Month's Problem." Selected answers will be published, with credit (unless you specify otherwise). We pay space rates.

What Is *Your* Problem?

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers, Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.



Everything Is Centrifuged But The Smell!

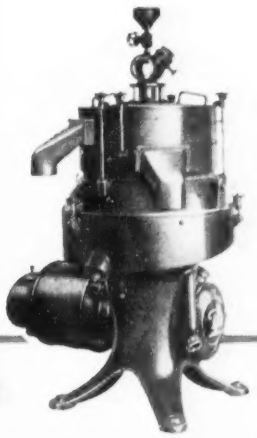
The Operation...
Oil From Fish Meal

The De Laval "Nozzle-Matic"® Separator shown here is recovering the oil from fish press liquor. The machine is a three-way centrifugal, designed to run for long periods without the necessity of stopping for bowl cleaning. Most of the solid particles (that would clog the bowl of a two-way centrifuge) discharge through nozzles along with a portion of the heavy liquid.

The stick water from the water discharge of the centrifuge is further processed by means of evaporators to yield fish solubles high in protein. Thus there is virtually no waste whatever of the fish by-product!

This is not a new application for De Laval centrifugals but it is a very effective one. It is included in this series to remind you that De Laval engineers may be able to speed up ***your*** process, too, if you have a problem involving continuous separation or clarification.

THE DE LAVAL SEPARATOR COMPANY
Chicago POUGHKEEPSIE, N.Y. San Francisco



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I give that floor a SHINE
Not a smear

And I've been pushing this same
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Oblong mop head, with zipper for quick change, for rapid dusting of aisles and other open areas. Made in 12", 18", 24", 30", 36", 42" and 48" widths.

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How do Fuller mops combine dust-grabbing qualities with long wear? The answer is in the yarn. If the cotton mill twists each strand tightly, you get the tensile strength for wearing qualities – but the yarn is not open enough to gather dust particles. Loosely twisted yarn, however, will not stand up.

So the Fuller laboratory experimented. We learned that long-staple cotton is imperative. It can be spun loose enough for dusting, yet retain the needed tensile strength for long wear.

The Fuller laboratory worked out and gave twisting specifications to the cotton mills. Now, when a mill delivers yarn, the Fuller laboratory checks each shipment – and you can be sure of mops giving balanced performance.

How to Start Each Job with a Clean Mop

Buy three mop heads for each handle. Then one can be in use, the second at the laundry, and the third in reserve on your storeroom shelf.

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simple temperature controller could be installed to prevent over-cooling.

If these suggestions are not effective, we recommend that you refer the problem to the manufacturer of the filling machine. Your problem is not an uncommon one. And, in all probability, the manufacturer will offer you spouts designed for consistency of your product.

Wants to Make Candied Apples

Question—We are considering producing candied apples. Can you tell us how to make them?

Answer — Manufacturing candy-coated apples is a simple two step operation. First heat 10 lb. of sugar, 4 lb. of corn syrup, and 2 lb. of water to 300 deg. F. in a small steam-jacketed kettle. After the steam is turned off, red color (amaranth or ponceau) is mixed in with the candy.

The second step calls for dipping the apples into the candy and then cooling them on a greased pan.

To Make Beverage Powders

Question—May we have several typical formulas and information on manufacturing dry mixes for home preparation of various flavored non-carbonated drinks?

Answer—Here is a basic formula for a lemon-flavored drink: Granulated sugar, 86 parts; lemon powder (commercial), 14 parts; and citric acid, 0.1 part.

When mixed with water, 4 oz. makes approximately 1 pint.

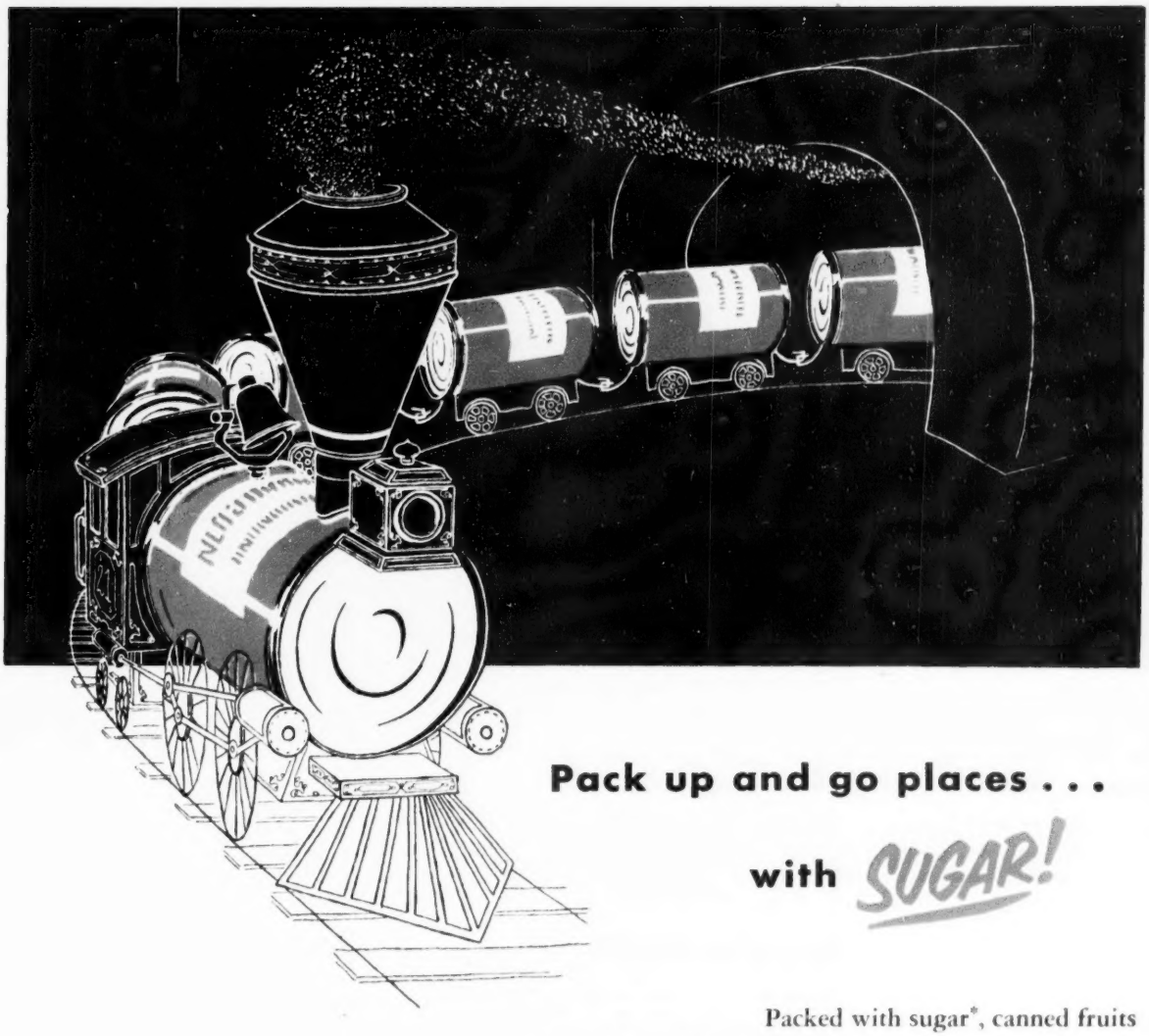
Another basic formula, this one for a chocolate-milk powder, consists of: Granulated sugar, 25 lb.; cocoa powder, 27 lb.; non-fat milk solids, 13 lb.; vanillin, 1 oz.; salt, 1 oz.; and ground cinnamon (optional), 1 oz.

With these formulas as a starter, we are confident you can work out satisfactory ones with the flavor and color characteristics you desire.

Manufacturing consists mainly of mixing and packaging. A horizontal ribbon-type mixer should be satisfactory for preparing a batch. And mixing should be carried out long enough to insure absorption or evaporation of liquid constituents so that the product is free-flowing.

To obtain uniformity in color and flavor, you might find it advantageous to add both in liquid form. And to minimize lumping, sprinkle or spray the solutions along the top of the ingregients in the mixer.

A vertical, centrifugal-type mixer might also be used. Such a unit would lend itself to continuous production if the ingredients could be fed to the mixer at controlled rates and in the desired proportions.



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Packed with sugar*, canned fruits travel faster from dealer's counter to kitchen table! That's why sugar, and *only* sugar, is used by leading canners!

Sugar aids color retention—retards vitamin oxidation—and helps preserve the flavor and texture of fruits. Sugar is easier to use—requires no special handling or storage—provides 25 to 50% more sweetening power.

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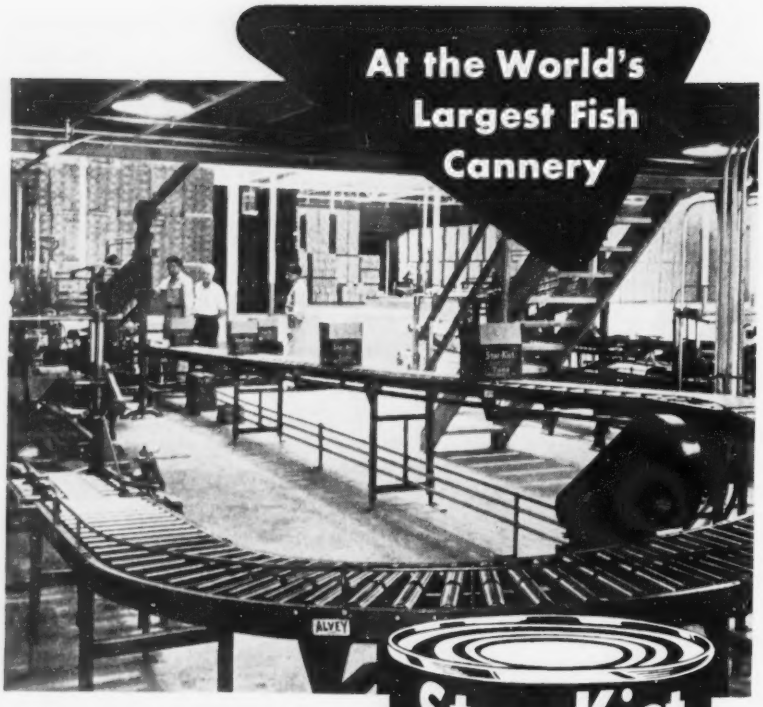

TONS of Star-Kist Tuna TRAVEL

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Carefully planned production schedules at the French Sardine Company's new Star-Kist Tuna plant are maintained with the help of an Alvey-engineered conveyor installation. Through the carton sealers and through various other operations, Alvey conveyors provide the timed transportation of cases.

To efficiently coordinate the movement of products and materials throughout your plant, investigate the advantages of Alvey conveyors. We will be glad to have an experienced Alvey engineer assist you . . . without obligation.

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After screening out lumps, the product may be packaged by any number of net weighers of volumetric fillers. It should be packaged in a siftproof and reasonably water-proof material. Heat-sealable envelopes or crimp-sealable wax paper bags within cartons may serve the purpose.

These drink powders may also be efficiently packaged by combination machines—those that simultaneously prepare a bag and fill the product into it.

What To Do With Bruised Dates

Question—We seek information concerning salvaging bruised fresh dates that are not suitable for a fancy pack. Our idea is to cut these damaged dates into small pieces, then dry and package them. Inasmuch as our volume is not too great, we do not want to purchase expensive drying equipment. Do you have any suggestions on how we can package dried, bruised dates inexpensively on a small scale?

Answer—Your suggestion—cutting the damaged dates into small pieces, partially drying them, and then packaging the fruit—is a good one. To do this, it is not necessary to purchase expensive dehydrating equipment. All you need to do is have a local machine shop construct a small cabinet-type, gas-fired dryer.

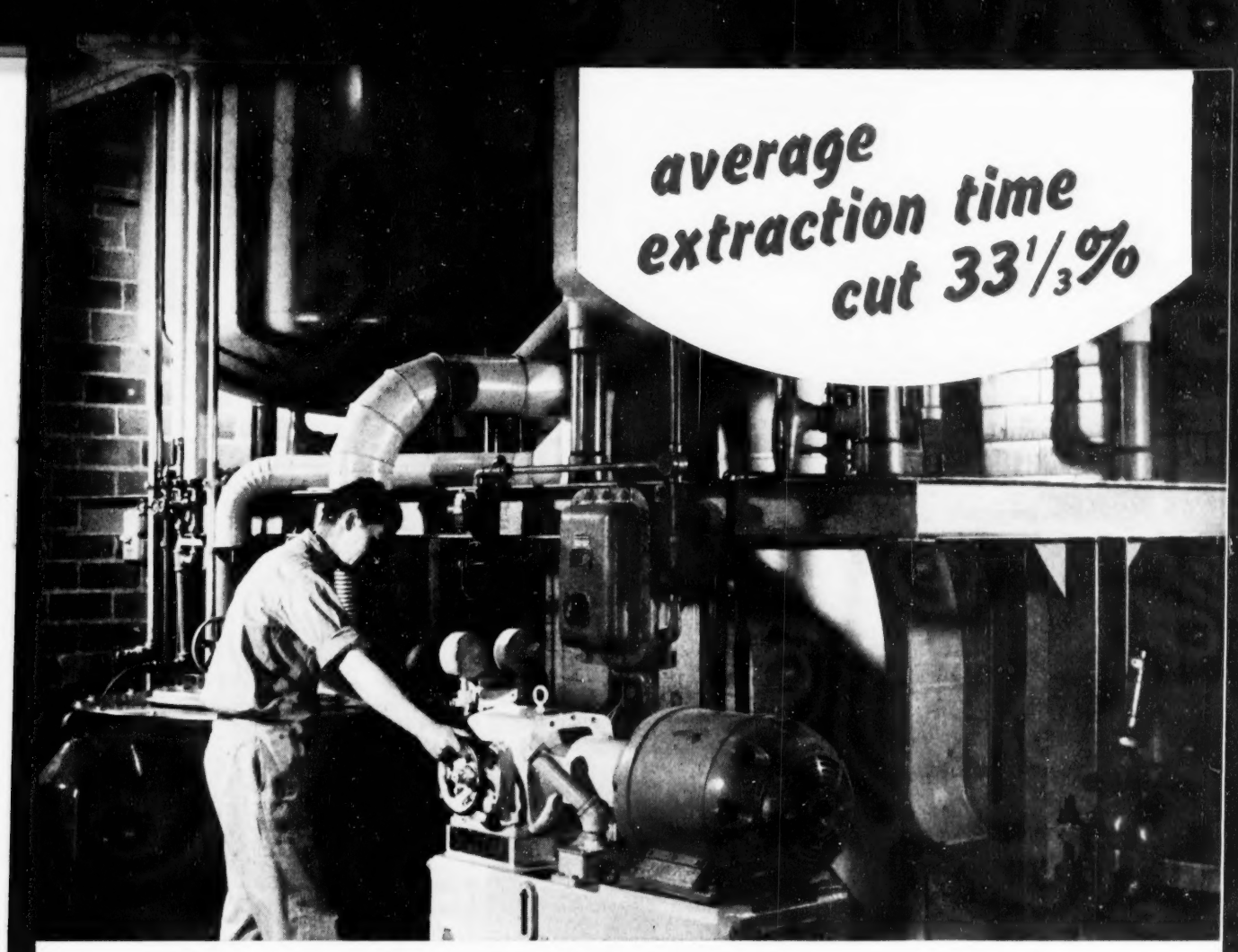
Not knowing your volume, it is difficult to furnish you with detailed specifications for a simple tray-type dryer. However, here are specifications for a small drying unit, which you can vary to fit your requirements:

Construct twelve wire-screened bottomed trays (3x24x36 in.). Sides of the trays may be constructed of wood or metal. For the cabinet, use 1¼-in. galvanized angle iron, bolted together. The cabinet should be about 3x4x8 ft., made of 12-gage galvanized iron sheets. No insulation is required.

Air for drying should be duct-fed through several Fiberglas filters, and then over a row of low burning gas burners. Warm air—about 135-140 deg. F.—should then be circulated around the twelve trays of cut dates.

Facilities should be provided for alternately starting and stopping a blower driven by a small horsepower motor. An automatic timer might be employed for this purpose. A circulating fan operating in this manner will control the drying temperature at about 140 deg. F.

Drying the dates in this type unit may take about 10 hr. And, when dried, the product is then cellophane-wrapped to produce a solid pack. A product of this type has a number of uses in the bakery and confectionery fields, particularly as fillings.



Once more the ANY-SPEED Oilgear Drive betters machine performance "painlessly"

Many times in our experience the performance of an already highly efficient machine has been bettered without redesign, solely by changing the drive. One case out of many *varied* cases, is the Tolhurst Centrifugal pictured above, located in a great pharmaceutical house. This centrifugal was originally equipped with a two-speed electric motor drive. However the chemicals it is called upon to handle have widely varying crystal packing characteristics. Some of these crystals packed so densely at the speed available, extraction was inhibited, extraction time far out of balance and crystal removal difficult.

A change was made to an *"ANY-SPEED"* Oilgear Fluid Power Drive. Now the operator is able to shade the speed of the centrifuge experimentally—*and easily discover* the *best* speed for each batch of crystals.

As a result, extracting that used to take from 6 to 9 hours was cut to 4 to 6 hours. The extremely slow speed also available made unloading a great deal easier. This user now has several other Oilgear drives including one on a laboratory centrifuge.

There is very often a direct efficiency coefficient between machine operating speed and the type of work being handled. And we can cite many widely varying instances where equally dramatic and profitable gains resulted at once from a simple change to *"ANY-SPEED"* Oilgear Fluid Power Drives. If you want some interesting factual data on Oilgear's steplessly variable speed drives, their outstanding responsiveness to control impulses, their smooth acceleration and deceleration, talk to an Oilgear Engineering Representative. His mature and sound engineering recommendations may profit you greatly. THE OILGEAR COMPANY, 1580 W. Pierce St., Milwaukee 4, Wisconsin.

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TYPICAL of the outstanding flavoring specialties developed by our laboratories for every flavoring purpose is our FRITZBRO TRUE MAPLE CONCENTRATE. *Leading manufacturers of table syrups who have made exhaustive taste tests acknowledge this to be the finest true maple flavor they've ever used. Whatever your flavoring need, rely upon* FRITZSCHE . . . . *A FIRST NAME IN FLAVORS SINCE 1871.*

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You might also consider preparing a date-meat paste. To produce a paste, simply mix a small amount of invert sugar with finely ground dates. Then pack the paste in No. 10 tins or 1-gal. jars. Bakers and confectioners will also accept this type of product.

Making Partially Baked Rolls

Question—What oven temperature should be employed for partially baked rolls? And how long should these rolls be baked?

Answer—The actual baking temperature should be between 275 to 300 deg. F. and the baking time between 10 to 15 min. Longer baking, of course, is required with a lower oven temperature.

These low baking temperatures are necessary to assure gelatinization of the starch and the absence of a crust color. Starch gelatinizes at approximately 170 deg. F. And, when gelatinization occurs, the partially baked goods are sufficiently rigid to stand up during subsequent packaging and handling.

Fast Cooling of Oils

Question—We would like to improve one of our processes—cooling a major ingredient, vegetable oil, to about 50 deg. F. prior to use. We have attempted to do this by holding the oil in cold-water jacketed tanks equipped with agitators. This method, however was too slow. Have you any suggestions on a more rapid cooling technique?

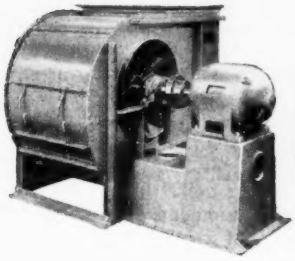
Answer—Undoubtedly, the reason for slow cooling of the oil in your tanks is the notable increase in the viscosity of the oil as its temperature approaches 50 deg. F. This, of course, causes an increasingly thick film of chilled oil to remain on the cold walls of the tank. As a result, flow of heat into the cooling medium is hindered.

A heat-exchanger, in which the oil can be rapidly circulated so as to thin down this cold oil film, will assure more efficient transfer of heat.

For example, a plate-type heat exchanger—similar to those used in dairies—would be suitable, provided it is properly designed for the job. It would be well, however, to make certain that the manufacturer thoroughly understands the nature of the product, hourly quantity to be handled, and the temperature range.

As above stated, the viscosity factor calls for the need of a considerable amount of plate area. And the pressure drop is apt to be considerably above that normally found in dairy work.

Naturally, the plate gaskets must be



DRAFT FANS

"Buffalo" mechanical Draft Fans are helping turn out low-cost steam in plants and major utility stations everywhere.

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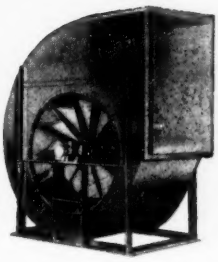

LIMIT-LOAD FANS

"Buffalo's" most widely used ventilating and air conditioning fans. 600 to 500,000 cfm capacities. Quiet, non-overloading, efficient.

BULLETIN 3737

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for engineering information to help you pick the BEST FAN for your JOB

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Gentlemen:

I have looked over the checklist of quality "Buffalo" Fans on this page. Please mail me Bulletins Nos. _____

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P.S. I would also like information on the line of "Buffalo" Centrifugal Pumps. The job I have in mind would have the following hydraulic conditions: _____

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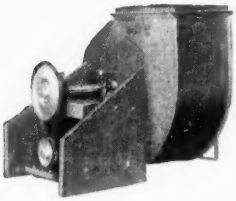

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Non-overloading ventilating fans for duct or free air delivery. Extra quiet.

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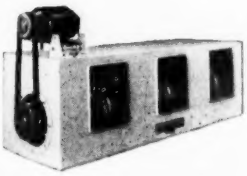

SHORTBOY VENTILATING SETS

Quiet, efficient, vibration-free fans. Wheels mounted on hollow shaft.

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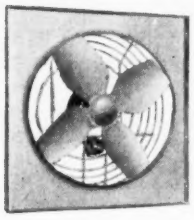

New! NV-BREEZO FANS

Their specially-shaped four-blade wheel gives high efficiency even against system pressures of ¼" and ½". 8" to 24" sizes.

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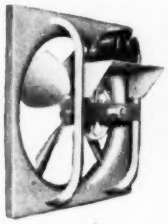

New! BELT-AIR FANS

Quiet, sturdy fans to move a lot of air at negligible cost. Heavy-gauge die-stamped blades and panel.

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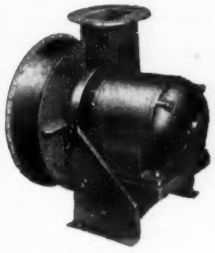
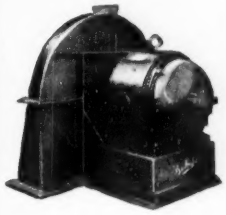


"CB" PRESSURE BLOWERS

Up to 2¼ psi, single stage with these husky, space-saving units!

BULLETIN 3553



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In sizes for up to 4 psi, and capacities up to 75,000 cfm. Complete range of sizes, extra heavy-duty construction.

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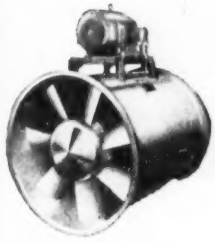
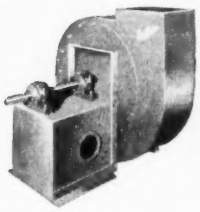


AXIAL FLOW FANS

Compact, light, highly efficient ventilating fans for light duty.

BULLETIN 3533



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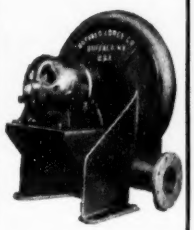
All welded for strength and high efficiency. With air or material wheels.

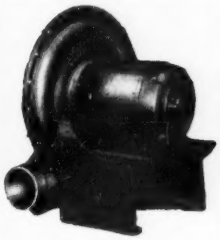
BULLETIN 3576



"RE" BLOWERS - EXHAUSTERS

For pressures up to 40" of water; 50 to 1600 cfm. Furnace blowing, line boosting.

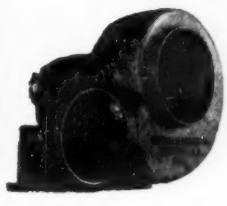
BULLETIN 3014



"E" BLOWERS - EXHAUSTERS

For low to medium pressures and volumes in draft, cleaning, line boosting.

BULLETIN 3014



BABY CONOIDAL FANS

Adjustable discharge, compact design, multi-blade rotors make these fans ideal for many small jobs.

BULLETIN 3576

VOLUME FANS

Rugged blowers-exhausters with cast iron housings and dust-proof ball bearings for any job up to 10" s.p.

BULLETIN 3615

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DAY SINCE 1881
DUST CONTROL
A SINGLE UNIT OR A COMPLETE SYSTEM

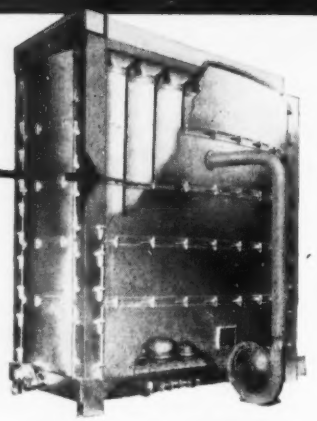
FOOD PLANTS FIND DAY HIGH PRESSURE REVERSE AIR JET CLEANING ACTION

MORE ECONOMICAL MORE EFFICIENT

Automatic, continuous cleaning of the entire filter tube is the most important improvement in cloth dust filtering in half a century. DAY's advanced method of cleaning the filter cloth gives you filtering efficiencies up to 99.99+%.

DAY's reverse air jet mechanism provides uniform cleaning over the entire length of the tubes.

Reverse Air Jet Ring Travels Continuously Up and Down The Entire Filter Tube. High Pressure Reverse Air Blown Through The Filter Felt Keeps Filter Tubes Clean Constantly.



99.99+% Filtering Efficiency Provides Important Savings In Reclaiming Valuable Products

DAY's improved cleaning action permits the use of a better grade wool filtering fabric which gives filtering efficiencies up to 99.99+%. This better filter cloth also allows higher air-to-cloth ratios with uniform back pressure. Plant space is saved because less filter is needed to handle equal volumes of air, and one DAY "AC" Dust Filter can handle four different product streams simultaneously, without mixing. It will pay you to investigate the DAY "AC" Dust Filter for your dust control program.

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made of oil-resisting synthetic rubber.

A cooler of this type offers these advantages: (1) Easy cleaning, (2) close and accurate temperature control, and (3) flexibility.

By way of illustration, flexibility is practical. A continuous heat-exchanger can be set up for recirculation into a large storage tank. In this way, incoming oil shipments can be promptly cooled in hot weather for the purpose of maintaining quality. Furthermore, future increases in capacity can be simply provided by adding more heat-exchange plates as well as replacing the oil and also the chilled water pumps with larger size units to provide for pressure drops and larger volume through-put.

Removing Rodent Pellets

Question—Is there a practical way of removing rodent pellets from mustard seed? As far as we know, both have approximately the same specific gravity and cannot be separated by specific-gravity methods. Likewise, they are practically the same size and cannot be separated by screening.

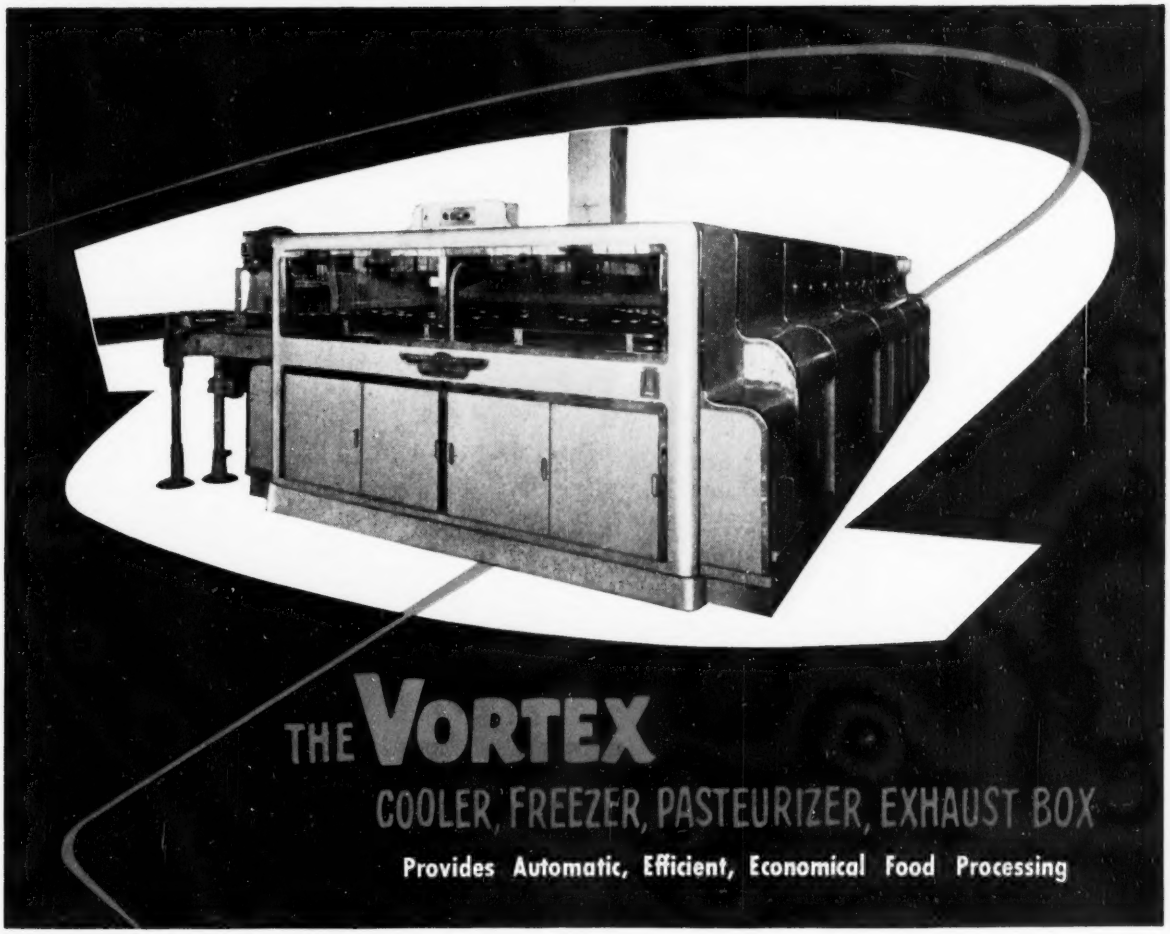
Answer—This is indeed a troublesome problem. Only method we know is to use a seed cleaner which consists of a vertical spiral chute fabricated out of smooth sheet metal. Mustard seed, being practically round, moves—under the influence of centrifugal force—toward the edges of spiral chute during its downward travel. The pellets do not progress as far radially, and so they are discharged nearer inside edge of chute. Movable dividers at discharge point separate the two fractions which then drop into containers.

This equipment is manufactured by Cleland Mfg. Co., Minneapolis, Minn. It does not take up much floor space, but does require considerable headroom. If a two-floor operation is possible, the contaminated seed can be fed from the second floor. Otherwise, some elevating means will be required to feed the seed to the top of the chute.

Depending upon degree of contamination, it may be necessary to recycle some of the seed. For example, discharge may include an easily separable fraction of perfectly clean seed, one of definitely rejected "tailings", and an intermediate fraction requiring further separation. It is this intermediate fraction that must be re-cycled.

Contaminated Dressing

Question—We have been puzzled by presence of light-colored fuzzy material on the surface of a few of our jars of salad dressing. Repeated exam-



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Operation of the "Vortex" is entirely automatic and continuous. Accurate dial control of speed assures correct processing time. Compact design conserves valuable floor space.

Engineering advantages include the patented "walking beam" conveyor which moves containers through processing zones, yet the conveyor itself remains at the same temperature throughout the processing operation. This eliminates the usual cost of heating, cooling or reheating the conveyor system. Hydraulic drive eliminates many gears and cam movements. Power requirements are low.

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Yes — and numerous special installations are running as high as 300 per minute! Machine wraps single or multiple item units in neat, square cornered packages that *stimulate product interest — prompt buying action.* You cut packaging costs, too, with reductions in labor and materials. Most installations require only one person for both feeding and operating machine. Unless specially desired or actually needed, products are beautifully wrapped *without* boards or stiffeners. "Float" wrapping is the answer. Any type wrapping material may be used — with preprinted labels accurately positioned. Likewise, any type of automatic feed and wrapper sealing can be employed—including hermetical sealing. If you want *speed* and *improvement* in your packaging, investigate the Campbell Wrapper today!

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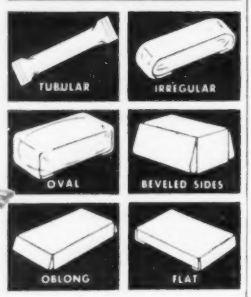

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mations failed to disclose any foreign material in the product within the filling-machine hopper. All jars are thoroughly air cleaned immediately before filling. Can you suggest the origin of contamination and how it can be overcome?

Answer—Have you considered the possibility that this material may be entering with the caps? When closures are received random-packed in corrugated containers, it is often customary to open the top of cases with a knife. In so doing, minute shreds of fibreboard material may drop into the caps to be eventually carried into the products.

This trouble can be overcome by exercising more care in opening boxes containing closures. You might also consider introducing a jet of compressed air, or a blast from a small blower, against the underside of closures as they travel down the feed to capping machine.

As a further precaution, make certain that the jars are well protected from air-borne debris during their travel from cleaner to capper.

One final suggestion. Frequently check efficiency of the air cleaner to make sure that it is consistently removing dust and lint from empty jars.

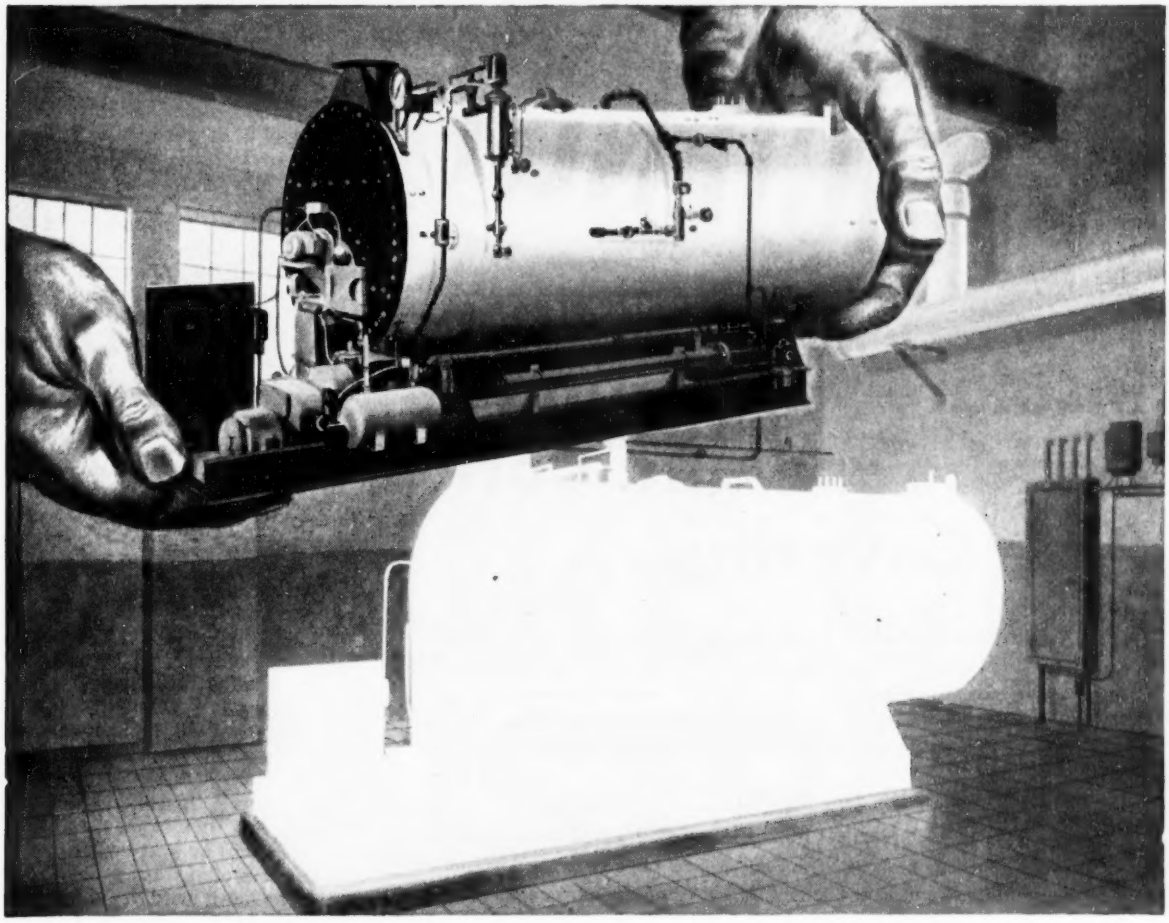
Chocolate Drink Separation

Question—Recently, our chocolate drink has been giving us some trouble —a fat ring appearing after six months. Our process involves making basic chocolate syrup with cocoa powder (18 percent fat), chocolate liquor, invert syrup, emulsifier, stabilizer, and flavor. This mix is homogenized three times under pressure at 3,000 psi. and then cooled. Next, fresh, low-acid skim milk is flash-pasteurized at 162 deg. F. for 15 sec., homogenized under a pressure of 3,000 psi., and cooled to 35 deg. F. Then homogenized skim milk is standardized to a 5 percent solids level. Correct amount of syrup is added. After thorough mixing, beverage is bottled cold, and capped. Bottled drinks are then sterilized in rotary cookers at 250 deg. F. for 17 min. and cooled. We have attempted to homogenize the finished drink, but have been unsuccessful. Have you any suggestions?

Answer—Separation of fat in sterilized, bottled chocolate drink is attributed to the large quantity of cocoa butter and low solids content. It is accentuated by length of time beverage is held at 250 deg. F. during sterilization.

To overcome this difficulty, we suggest that you: (1) Discontinue using chocolate liquor and obtain the flavor from low-fat cocoa; (2) use undiluted

Here's why you get more...when you buy a Cleaver-Brooks Self-Contained Boiler



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Cleaver-Brooks, originators of the self-contained boiler, offers wider experience that counts in another important way. Qualified engineers help you plan steam plants tailored *exactly* for your needs. Carefully analyzed are loads, space and equipment arrangement. This not only helps you solve present steam needs, but adds flexibility for future expansion as well.

This application engineering, plus basically sound design and construction is your assurance of a full return from your boiler investment. When you specify a self-contained boiler — make sure it's a Cleaver-Brooks.

Send for Catalog AD-100 for full details on Cleaver-Brooks boilers. Available for oil, gas and combination oil/gas firing. Sizes 15 to 500 hp, 15 to 250 psi — for heating and processing.

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3. THROUGH MORE THAN 80 YEARS AS CORK SPECIALISTS, we are able to preserve Corks' natural advantages in Mundet insulating products. Mundet engineers give you responsible assistance in building or expanding plant facilities. Let us help you secure low operating cost and maximum service.

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INSULATION FOR HIGH & LOW TEMPERATURE

skim milk; (3) mix all ingredients, pasteurize, and homogenize only once; and (4) arrange deliveries so as to reduce the length of time beverage remains in retail outlets.

If suggested changes do not overcome your difficulties entirely, you may have to adopt a short-time, high-temperature sterilization (285 deg. F.) technique, followed by aseptic filling. This process has proved satisfactory in canning of fresh whole milk.

Better Can Cooling

Question—In our cannery, we process in retorts and then convey the hot cans in crates through a conventional cooling canal containing well water. We do not have sufficient cooling capacity during peak periods. Moreover, our water supply is limited. Have you any suggestions on improving the efficiency of our can-cooling operation?

Answer—One possibility is to install a spin cooler, over which the cans travel. As they rotate through this unit, they are subjected to sprays of cooling water. This unit uses the latent heat of evaporation of water for cooling, whereas the canal system removes heat only by warming the water a few degrees.

We might point, out, however, that some products might be affected by the agitation they undergo during spray cooling.

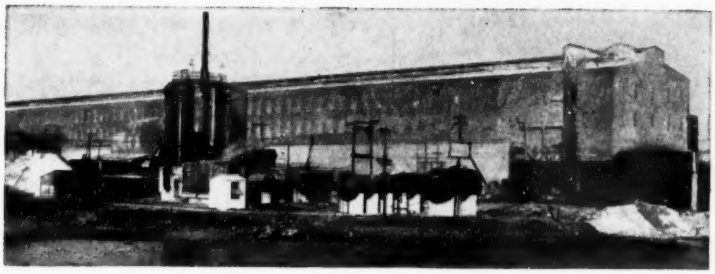
You might obtain better heat transfer in the canal by setting up rapid currents through the use of water-circulating pump. In this manner, the water is in closer contact with hot can surfaces. The heat-transfer coefficient is improved, thus enabling the water to remove more Btu's. from the hot product.

The same effect might be achieved by bubbling compressed air through the water. The air can be fed from a perforated pipe along the bottom of the canal. Usually, compressed air costs too much to be used for this purpose.

If neither of these measures are applicable, then install a water-cooling tower so that warm water from the canal need not be run into the sewer. Cooled water from the tower feeds to canal, along with fresh make-up water from the well. In this way, more heat can be removed with the same amount of water.

This also suggests the possibility of using overflow from the canal for fluming and cleaning purposes.

Your cooling problem would be radically altered if the product could be handled by the new asceptic-canning process. In this case, it would be cooled after sterilization, but before canning, in an highly efficient heat exchanger.



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says Jackson M. Spencer
Plant Lubrication Man
Southern Fertilizer and Chemical Co.
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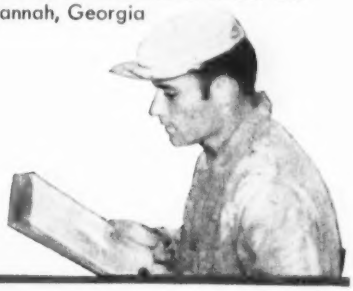

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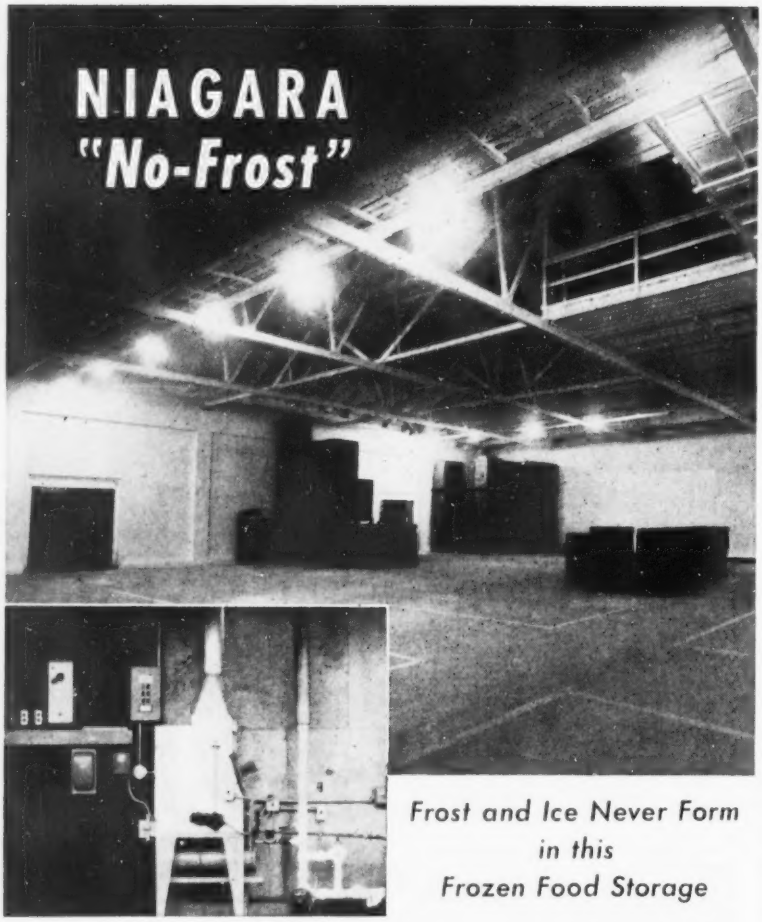

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Write for the No-Frost story and data on its application to your problem. Ask for Bulletin No. 105.

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DEPT. FI405 LEXINGTON AVENUE, NEW YORK 17, N. Y.

OVER 15 YEARS OF SUCCESSFUL EXPERIENCE PROVES THE VALUE OF NIAGARA NO-FROST

Triples Meat Output

—*Continued from page 71*

furters through the 1½-ft.-long casing stripper. This is a Plexiglas-enclosed section consisting of six beveled-corner square aluminum rolls (1x4 in.) that are set at a 45-deg. angle. As the franks ride over the first three rolls, part of the casing is removed. Before traveling over the last three, the franks go over a 1x4-in. perforated stainless roll.

Here, vacuum sucks the loose casing from the wieners and into the collecting drum. Any remaining bits of casing are then removed by the last three beveled aluminum rolls. A short Neoprene belt then feeds the skinless franks onto the packing belt.

Skinless franks travel on a 1x50-ft. Neoprene conveyor belt, flanked on each side by stainless steel packing tables. Suspended about 2 ft. above the belt is a tent-shaped, stainless steel combination light shield and rack for packaging materials. Management has found that this simple installation prevents the packers from holding work-interrupting conversations across the packing line.

Packaged on this line are baby franks in ½-lb. units and regular wieners in 1-, 5-, and 10-lb. lots.

New Luncheon Meat Line

Four girls, operating four U. S. slicing-stacking machines and a Wrap-King wrapper, now turn out 60 cellophane-wrapped packages (½-lb. size of sliced luncheon meats per minute.

Square shaped luncheon meats are formed in 4x4x24-in. molds to obtain more uniform slices and to reduce end losses. Formerly, luncheon meats were formed in conventional 6-lb. loaf molds. Round shaped meats are also prepackaged.

Loaves are sliced to the desired thickness and automatically stacked on a Neoprene conveyor belt. After a stack of eight slices has been formed, the conveyor is automatically actuated, travels about 6 in., and then stops to receive another stack. Each stack of sliced meat is check-weighed and placed on a cardboard backing.

A short chain-belt conveyor with metal flights spaces each stack in time with a plate-type elevator. As the elevator raises the meat to an 8-pocket rotating wheel, roll-fed cellophane is cut to length and forms over the stack of meat. Upon entering one of the pockets (either square or round), three reciprocating plates tuck the film around the bottom of the meat. The pocket wheel carries the

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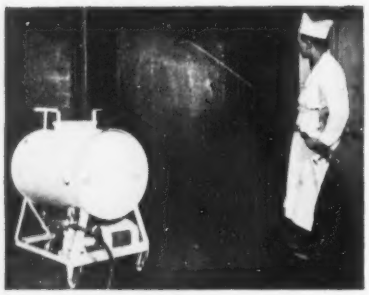

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All you do is make up the cleaning solution in the tank of the Unit—flip the switch, open the valve, and start spraying. Unit discharges up to 1¾ gallons of cleaning solution a minute under 50 pounds pressure—cleans areas up to 15 feet away from spray nozzle, up to 50 feet away from Unit. And you can wheel it about your plant to clean equipment in place—tanks, tables, floors, fillers, conveyors, ovens, cellars, refrigerating rooms, trucks, etc. Tops for paint stripping, too.

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Technical Service Representatives in Principal Cities of U.S. & Canada

stack over a heat-sealing plate. Meanwhile, a metal form presses the top of the stack to provide contact of film with sealing plate.

Packages now are discharged from the wrapping machine onto another chain-belt conveyor that carries them to a thermoplastic labeling unit. Printed labels carrying a colored picture of the product are applied to the cardboard-backing side of the package.

End (*Resume reading on page 72*)

How Good Is Frozen OJ?

—*Continued from page 127*

compared to 878 cc. for California fruit.

WASTE—There was more waste per dozen of California oranges than for Florida fruits, except for two months of the test period. California oranges averaged 57.9 percent waste; Florida, 53.1 percent.

PULP—Averages on percentage of pulp were as follows: Florida oranges, 15.6 percent; California, 14.3; Brand A concentrate, 10.2; Brand B, 10.9; Brand C, 8.8; Brand D, 11.3. As in all the results, the fresh juices showed the greatest range—17 percent, against 10 percent for the concentrates.

pH—Averages for pH were: Florida, 3.71; California, 3.62; Brand A concentrate, 3.65; Brand B, 3.66; Brand C, 3.66; Brand D, 3.51. Ranges were: Florida juice, 3.32–4.27; California, 3.12–3.87; concentrates, 3.40–3.78.

TITRATABLE ACIDITY—Calculated as anhydrous citric acid, these are the results on titratable acidity: Fresh Florida juice, 0.86 percent; California, 0.97; Brand A concentrate; 0.89; Brand B, 0.86; Brand C, 0.88; Brand D, 1.02.

How Tests Were Made

The products were examined in the condition that consumers receive them at point of sale, samples being purchased from five neighborhood markets of several types. This involved squeezing 3,000 fresh oranges and reconstituting 522 cans of frozen concentrate over a 2-yr. period (1950–52). The concentrate brands purchased represent about 50 percent of current production at that time.

Fresh Florida and California oranges were divided into three lots. One was squeezed with an electric reamer, a second by a half-orange squeezer, the third by a whole-orange squeezer.

The 6-oz. cans of concentrate were reconstituted to 750 cc. by adding 3 full cans of water, as most homemakers do.

End (*Resume reading on page 129*)

Things are hot for you!

...and FOOD ENGINEERING will show you
how* hot in its biggest issue in 25 years

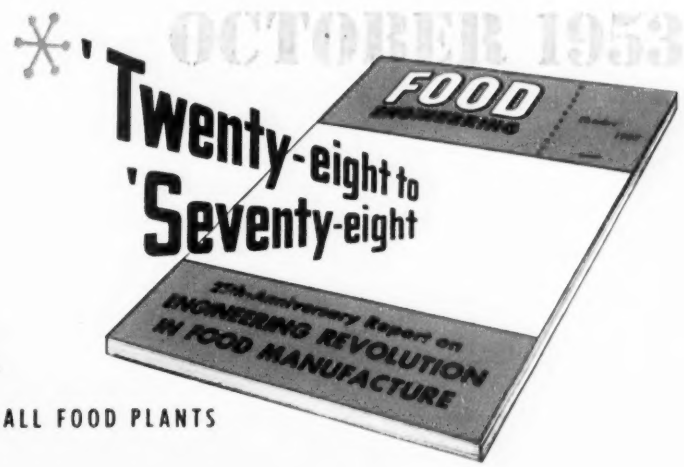
Yes, Mr. Food Plant Man, food's *hot* ...one of the *hottest* industries in America. Just let your thoughts wander back a decade . . . Think of the advances that have occurred in our industry!

But, more important, there is a terrific backlog of *impending* change . . . *things to come*. That's why a cross-section of you FE readers voted 12-to-1 in favor of a big *look ahead* in our October 25th Anniversary Issue. *You* decided that FOOD ENGINEERING should pause and analyze this rush of food-engineering progress . . . sort out the fact and fancy . . . project the sound trends of the past and present into a realistic picture of the food plant of tomorrow.

You gave us the assignment . . . and we're hard at it *now*.

In FOOD ENGINEERING's October issue, we will explore the present and future of food packaging, mixing, separation, heat-transfer, materials handling, instrumentation, waste disposal, sanitation, and many other food plant operations. We will probe the future of processing with x-rays, electronics, antibiotics, ultrasonics, and other new techniques.

All this and more are coming in FOOD ENGINEERING's October issue, as its editors explore the 25 years past . . . and, more important, the 25 years hence – *'Twenty-Eight to 'Seventy-Eight*.



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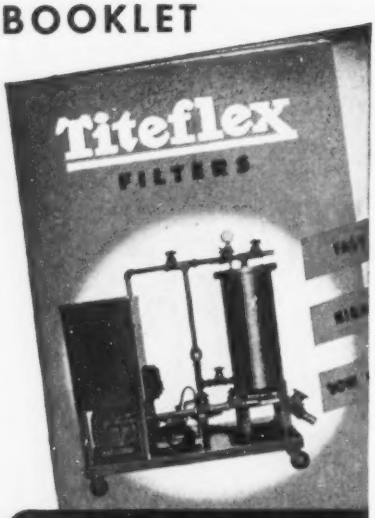

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Useful New Books & Government Publications

Lipid Technology

PROGRESS IN THE CHEMISTRY OF FATS AND OTHER LIPIDS, VOL. I. *Edited by R. T. Holman, W. O. Lundberg, and T. Malkin. Published by Academic Press Inc., 125 E. 23rd St., New York 10. 1952. 186 pages; 6¼x9½ in., cloth. Price $7.*

First of a three-volume series, book includes group of articles dealing with biochemical, physical, and biophysical aspects of fats and fat products. These articles were originally intended for a new edition of *Chemie und Technologie der Fette und Fettprodukte*, by Hefter and Schoenfeld. On death of Dr. Schoenfeld, however, completed and projected manuscripts were reviewed and prepared for this series.

Book offers critical and authoritative surveys of fatty acids, sterols, phosphatides, and fatty acid derivatives. Indexed by name and subject.

Re Employee Restaurants

FOOD SERVICE EQUIPMENT. *By Committee on Food Equipment Standards. National Sanitation Foundation, Ann Arbor, Mich., 1952. 64 pages; 6x9 in., paper. Price 50c.*

Though aimed at the commercial restaurant and cafeteria owner, this text is conversant with problems affecting industrial establishments of the same nature.

Public welfare is the keynote here, and standards of sanitation and equipment—often inseparable—are accented. A noteworthy implication is that use of the text will give greater assurance of being able to pass reasonable health standards of local inspectors.

Text is well illustrated photographically and diagrammatically.

History of Foods

MAN'S FOODS. *By Lloyd B. Jensen. Published by The Garrard Press, Champaign, Ill. 1953. 288 pages; 6¼x9¼ in., cloth. Price $4.50.*

Set down in this book with a new viewpoint, the history of foods is treated under three major headings: Food Gathering Times, covering a period of some 400,000 years; Food Producing Times, which began about 8,000 years ago; and Nutrition and its role in biological and social evolution.

The text is factual—supported by more than 640 references to authoritative sources—without losing the informative and interesting narrative tone. Covering the development of the science of nutrition, it gives new perspective to knowledge of the past and opens up new horizons for future research.

The author, chief bacteriologist for Swift & Co., Chicago, was formerly first assistant in experimental bacteriology at Mayo Clinic and held teaching positions at the University of Chicago and the Mayo Foundation of the University of Minnesota.

Starch Industry Survey

STARCH, ITS SOURCES, PRODUCTION AND USES. *By Charles Andrew Brautlecht. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 36. 1953. 408 pages; 6x9¼ in., cloth. Price $10.*

This general survey of the entire starch industry gives sources, technology, and uses.

Major emphasis is on white potato starch—its characteristics, specifications, methods of analysis, uses, and economics of various plant materials.

Detailed information is also included, however, on other starch sources, such as sweet potato, corn, tapioca, wheat, and rice.

Material is documented by selected references, and latest processes and equipment used in starch production are described and illustrated.

Refrigeration in USA

THE COLD CHAIN IN THE U.S.A., PART I. 1951. 80 pages; 6x9½ in., paper. *Price* $1.50. THE COLD CHAIN IN THE U.S.A., PART II. 1952. 452 pages; 6x9½ in., paper. *Price* $6.50. *Published by the Organisation for European Economic Co-operation, Paris, France, and distributed in U. S. by Columbia University Press, 2960 Broadway, New York 27.*

Under the auspices of the OEEC, Paris, and the ECA, Washington, D. C., a mission of European experts was sent to the U. S. in the latter part of 1950 to study essential features of American refrigeration equipment. Published in 1951, this first survey discusses economic development of the refrigerating industry and summarizes main conclusions. A number of recommendations were also made on what should be done in Europe to develop use of refrigeration.

Following this, a more compre-

(*Turn to page 195*)

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Naturally, you can expect enhanced pure food flavors from Huron MSG, America's original monosodium glutamate made from wheat protein. But you also get unexpected bonuses: retention of original taste and quality levels far beyond usual storage periods, and improved color and texture. What's more, the flavor of many foods actually improves *during* storage when treated with Huron MSG. Such as:

FISH . . . salmon, shrimp, mackerel, haddock and rose fish gain in flavor and all-around palatability. In many cases their original color remains true throughout storage.

MEAT . . . beef, pork sausage, bacon and ham acquire heightened flavor, retain their prefreezing quality longer.

POULTRY . . . all fowl have improved flavor and added juiciness, as well as lengthened storage life.

VEGETABLES . . . most vegetables are given a new full sweetness of flavor. Green vegetables retain color throughout storage and in cooking.

Our Technical Service Department will be glad to furnish you with the cold facts about the best way of using Huron MSG to make your frozen foods taste better, last longer in storage—*and sell faster.* Write or phone—no obligation, of course.

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Pure Monosodium Glutamate 99+%

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hensive study was made and is extensively reported in a second volume, published in December 1952. Well illustrated, this provides information on a wide range of matters relating to refrigeration, covering scientific as well as technical and economic aspects. The survey is divided into five sections: Basic considerations, refrigerating machinery, refrigerating plants, transport, and refrigeration as applied to perishable foods.

Although compiled principally to give a fresh impulse to the European refrigeration industry, the information contained should be of considerable value to food processors and transportation people in this country.

Data includes specific details on application of refrigeration to perishable foods, poultry and fish processing and freezing, refrigeration of dairy products, and processing and distribution of frozen precooked foods.

In conclusion, there is a list of all persons intreviewed in this country, including experts in various fields of refrigeration, freezing, processing and distribution.

Government Publications

CORROSION-FREE BREAD CANNING. *Office of Technical Services, Dept. of Commerce, Washington 25, D. C. PB 111,063. 17 pages. Mimeographed.* 50c. Army Quartermaster Corps report on experiments to find lining and sealing procedures to use in the canning of bread so as to minimize corrosion inside the can.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered directly from the Bureau responsible for its issue.

ANNUAL REPORTS, various *Federal Departments and Agencies for fiscal year ending June 30, 1952. Prices varying from a few cents to over a dollar per copy. A limited supply of copies for free distribution is sometimes available by writing to the organization issuing the report.*

A SURVEY ON RESEARCH POSSIBILITIES FOR ANIMAL FATS. *Bureau of Agricultural & Industrial Chemistry, publication AIC-346, USDA, Jan. 1953. 64 pages.* Summarizes a survey conducted by John W. McCutcheon under research contract with USDA, with collaboration of Eastern Regional Research Laboratory.

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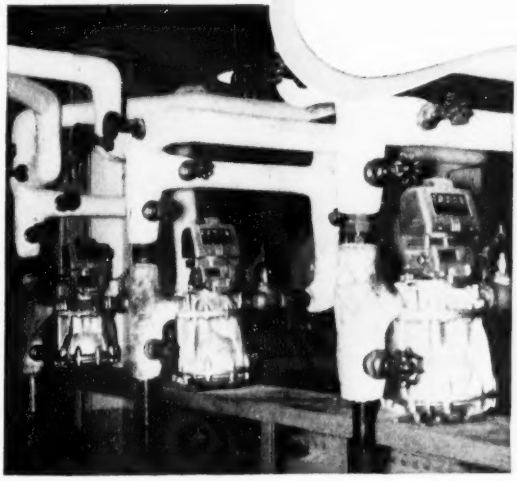

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Wherever extreme accuracy is an important requirement in the measurement or batching of liquid food ingredients . . . you'll find that Xacto meter can do the job easier and more accurately than you are now doing.

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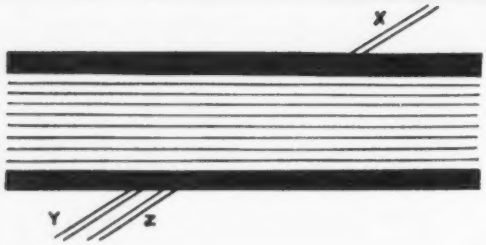

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Things don't always turn out to be *the way they appear.* Realizing this, leading food processors *test* with COOK-CHEX quality control tags.

And unless the purple spot on the tag has changed to green, they *know* that bacteria aren't completely destroyed. Write today for a free supply of COOK-CHEX, stating the time and temperature of your processes.

See for yourself how COOK-CHEX save time, save money, and insure your good name with consumers by eliminating the possibility of flat sours and blown cans.

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Get the most out of your Spraying Equipment with minimum power . . . with efficient spraying.

Use Yarway Nozzles. No internal vanes or other restrictions to clog or hinder flow. Two types—Yarway Involute-type producing a fine hollow spray with minimum energy loss, and Yarway Fan-type producing a flat fan-shaped spray with time-saving slicing action for cleaning.

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Thousands in use. Write for Bulletin N-616.

YARWAY SPRAY NOZZLES

YARNALL-WARING COMPANY
127 Mermaid Avenue, Philadelphia 18, Pa.

Sugar Free Drinks

—Continued from page 79

physio-chemical relationships occurring between CO_2 and the beverage itself. With the new syrup additive we are able to bottle sugar-free drinks with no more difficulty than is encountered in filling our regular line of true fruit beverages.

The physio-chemical mechanism responsible for the control of foaming is believed to result from two different processes occurring within the beverage bottle. The first process is formation between the CO_2 and the Carbo-Lok of a short-life compound that has a strong tendency to hold the gas in the beverage.

The second process involves increasing the surface tension of the beverage so that the tendency of the CO_2 to escape with agitation caused by pouring is greatly reduced.

Flavor Level

From the standpoint of dollars and cents, the question that has posed the greatest challenge to manufacturers of sugar-free beverages is the increased amount of flavoring required to achieve a flavor level that is comparable to that of sugar-based soft drinks.

For example, it has been found necessary to over-flavor or, expressed as percentage, to use 10-20 percent more ginger ale extract in a sugar-free drink than would have been required to attain a similar flavor level when using a regular sugar syrup. And the same ratio applies to true fruit beverages.

Finally, let me say that, although chemical sweeteners are organic compounds they have no similarities to sugar other than being sweet. Any slight food values they may have is below the level utilizable by the human system. Therefore they add no calories to beverages in which they are used.

Not Calorie-Free

However, all fruit juices contain natural plant sugars, and the alcohol used in flavoring extracts contributes calories. For this reason it is still not possible to formulate a *no calorie* true fruit beverage or pale dry ginger ale.

Yet, when a comparison is made between a sugarless true fruit beverage that contains less than six calories to a 12-oz. bottle, and a regular 11-12 Brix beverage that contains 200-plus calories, the fact is immediately evident that for many people the sugar-free or dietary carbonated soft drinks are a welcome addition to their regular table or party fare.

End (Resume reading on page 80)

Pushbutton System

—Continued from page 82

scale hoppers. These are mounted on 30,000-lb. Howe tank scales equipped with batching beams and microswitch cut-offs.

Beam is set for desired weight—allowance being made for material in pipe lines and appliances between storage and reclaiming filter—then Airveyor is started, and motorized withdrawal valve on proper silo is opened.

When set weight is reached, microswitch causes withdrawal valve to be closed, but conveyor continues to run until all material is out of lines.

To prepare ground malt, beam on one of the two ground malt scales is set at desired weight, malt polishers and mills are started, and conveyors that feed to and from them are set in motion. Then valve in bottom of selected whole-malt weight hopper is opened. When desired weight of ground malt is collected in receiving hopper, microswitch on scale causes valve in weigh hopper to close.

Procedure for adjuncts is similar to the above except that polishers are not employed. Whole and ground cereal weigh hoppers are smaller than those used for malt and are mounted on 20,000-lb. Howe tank scales.

Ground products are discharged by gravity from the receiving hoppers to processing—malt to mash tubs, cereal to cereal cookers.

In handling and processing the dry grains, flour-like dusts are produced that will quickly spread over floors and equipment in the plant, and also over the adjoining neighborhood—if something isn't done about it.

To eliminate this nuisance, a Pangborn dust collector was installed on the brewhouse roof. It is connected with all points in the handling system where dust may originate. These include vacuum and screw conveyors, malt cleaners, polishers and mills, cereal mills, silos, scale hoppers, and the system by which spent grain is moved from dryers to freight cars.

This installation requires 15,000 cfm. air, which is moved by two exhausters, each operated by a 30-hp. motor. An additional 7-hp. motor is required to discharge the dust.

The unit is wired to the control panel on the 5th floor so that no part of the materials handling system can function unless collector is running.

Not only has this equipment eliminated dust deposits, but it salvages an average of 500 lb. from each carload of grain. This cereal dust is added to the dried, spent grain, which is then sold as cattle feed.

End (Resume reading on page 83)

Cyclone Metal Belts Speed Processing, Reduce Hand Labor, Cut Cost Of Canning Tuna

● By the use of Cyclone Metal Conveyor Belts to carry Tuna through automatic processing operations, American fish canneries are able to compete economically with low-cost foreign-canned Tuna. Partially-cleaned and frozen fish are delivered right from the boats to the canneries. And here Cyclone Conveyor Belts take over. Production is faster, costs are lower and much hand labor is eliminated.

One of Cyclone's many belt types may prove just right for your plant's operation, too. Why not ask our experienced engineers for advice . . . and write Dept H-53 for a free copy of Catalog 94.

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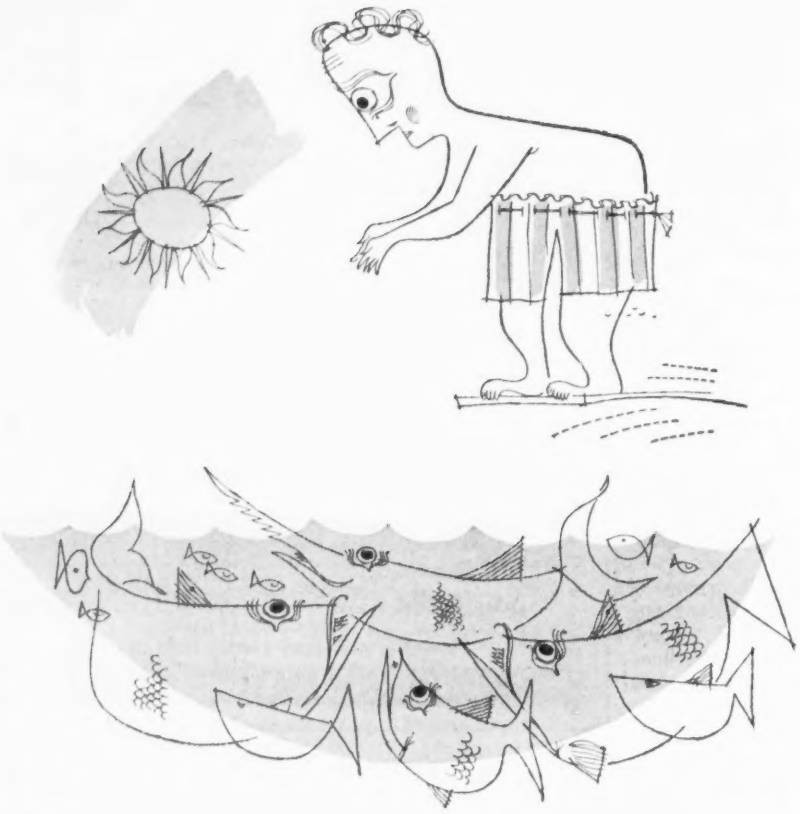

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The LIXATE Process is adaptable to your particular requirements. Write, and our representative will show you how.
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KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

Making Mineralized Salt

A non-caking sea salt containing seawater minerals commonly omitted is to be produced by Dixie Chemical Co., Houston, Tex.

Operations will be under license from Dow Chemical Co., whose U. S. Patent 2,606,839 covers a method of making the mineralized product nonhygroscopic, thus solving former storing and handling difficulties. Dixie has plans for production on a broad commercial basis if acceptance justifies.

Non-Stop Butter Whipping

Through installation of Oakes mixing machines, an eastern dairy is now continuously whipping about 2,000 lb. of butter hourly per unit. Butter is tempered to about 70 deg. F. and fed through the mixer under 40 psi.

Formerly, vertical type batch mixers were employed to aerate butter to about 0.6 its original density. But here product losses occurred. Also, the density of the butter varied.

Pear Waste to Alky', Feed

A new utilization of cannery pear waste whereby industrial alcohol and stock feed are produced is reported from California. Involving fermentation, distillation, and dehydration, the method is stated to have been tested successfully at an Aviso, Calif., distillery. Announcement came from the newly organized Barnard Processing Corp. of San Francisco.

Grain and Custard Studies

Comparison of nutrients in raw grain and in the bakers' bread made from it is the goal of extensive research to be launched July 1 by the American Institute of Baking. A further AIB study, just approved, aims at determining the sources of harmful bacteria causing spoilage of commercial cream and custard pastries.

Sterile Milk in So. Africa

A $140,000 plant to produce sterile milk has been put into operation in Johannesburg. Backed by 250 dairy farmers, the facility has a 1,000 gph. capacity. Following clarification and homogenization, the milk is bottled and crowned before sterilization.

Frozen Bread May End Stale Returns But Several Hurdles Hinder the Path

Arnold Bakers, Inc., Port Chester, Conn., has announced plans to produce and deliver frozen bread to its present market in 22 states and, in the near future, to a national market.

At the time of this announcement, Philip Talbott, Grain Branch, Department of Agriculture, stated that the consumer shift to frozen bread could eventually eliminate stale returns, which at present account for an annual loss of approximately 500,000,000 lb. of products of agriculture. He indicated savings might pay for the cost of freezing.

Freezing of bread by bakers also will enable bakeries to work right through on slack days, cutting down on the necessity of overtime pay and eliminating holiday work, with resultant cost savings.

Bread freezing studies are in progress for USDA's Bureau of Agricultural & Industrial Chemistry and Production & Marketing Administration through research at American Institute of Baking. Sought is a type bread that will remain fresh when frozen a year. AIB predicts such bread will become established within five years.

Arnold Bakers' plan is reported based on extensive research and experimentation, and already the company has distributed more than a million frozen loaves.

While freezing opens the way to new distribution methods for the specialty baker, several hurdles must be taken before the baking industry can sell frozen bread on a sufficiently large scale to materially affect stale-return losses. These are five prime factors—

1. Present frozen-storage space is insufficient for current frozen food production. If today's volume of bread were frozen and warehoused, a many-fold expansion of frozen food storage capacity would be needed.

2. If deliveries of frozen bread were entirely from bakery to home, then the demand for additional insulated and refrigerated trucks would assume fantastic proportions.

3. If marketing follows channels of other frozen foods through retail outlets, 10 to 20 times as many refrigerated store-cabinets would be required. And present installations are inadequate for today's volume.

4. Space in retailers' cabinets required for a loaf of bread will accom-

NEW LOAVES, says Arnold Bakers, Inc., can be bought in quantity and stored in home freezer indefinitely—to be eaten weeks, even months, later as fresh as on day they were baked. Immediate freezing after baking reportedly seals in flavor and freshness. Edibility of bread left four years in Antarctica by Byrd Expedition is stated to have inspired new product.

More Plants Making Film-Pack Juice

Those film-packaged 2½-oz. portions of frozen orange juice concentrate for the soda fountain trade are now shaping up to become a field-wide promotion.

Thus, some 100 million or more units may be turned out this year.

Now joined with Pasco Packing Co. of Dade City, Fla.—who originated the item last year (FE Oct. '52, p. 74)—are two other Florida concentrators. They are Fruit Industries, Inc., of Bradenton, and B & W Canning Co., of Groveland.

Furthermore, use of the cellophane-polyethylene laminated film for individual-drink packages has spread to California. There, Paramount Citrus Assn., of San Fernando, and Sunkist Growers, Inc., of Ontario, are putting up orange concentrate experimentally. And California Fruit Growers Exchange is testing an individual package of frozen lemonade concentrate.

Last year, Pasco produced something over 7 million units of orange juice for the Walgreen drug chain. This year it expects to make between 50 and 100 million, exact total depending on supply of mixing machines (quick reconstitutors) used in the stores to turn the concentrate into 10-oz. portions of juice.

Initial machines were supplied by The Cory Corp., Chicago, which has now stepped up production. Another type unit, working on a slightly different principle, has been developed by Food Machinery & Chemical Corp.'s Florida division, and production is currently being sped on these.

In the view of Glynn Davies, assistant president of Pasco, at least 10 percent of the entire Florida production of frozen orange concentrate will be put up in these film packages within a year or two. He states Pasco plans a similar package for home consumption—to be sized for a 6-oz. drink and packed six or eight to a carton. He also sees eventual packing of grapefruit, lime, lemon, grape, and pineapple juice in this form.

On the theory that what benefits one benefits all, Pasco has urged others to get into the picture, and it has offered to share its technical knowledge.

At Bradenton, Fruit Industries has installed one packaging machine and has two more on order. And B & W Canning Co. has put in one machine. Made by Stokes & Smith Co., Philadelphia, subsidiary of Food Machinery & Chemicals Corp., and the Bartelt Engineering Co., Rockford, Ill., these units will turn out 100 packages a minute, or 120,000 per 20-hr. day.

Meanwhile, Florida Citrus Mutual, cooperative association of 7,000 growers, has opened its financial program to assist installation of retail reconstituting equipment on low-cost financing. And it has already had well over 2,000 requests.

Against possibility of a bottleneck in supply of laminated film, Union Carbide & Carbon Co. is building a new plant. At the start, only satisfactory film was that made by Standard Packaging, Inc., of Jersey City, N. J., but now there are two other producers—Dobeckmun of Cleveland and Shellmar of Mount Vernon, Ohio.

Pasco's packings at first were in a film in which polyethylene was 0.002 in. thick, but this has now been thinned to 0.0015 in. with successful results.

modate 8 to 15 cans of frozen juice, the latter selling between $1.50 and $2.75. To justify space, bread would require higher markup and lightning turnover.

5. To profit on the once-a-week-purchase advantage would require approximately 1 cu. ft. extra of freezer storage space in every home.

For some time to come, then, frozen bread seems destined to be a specialty item.

To Can Cuban Pineapple

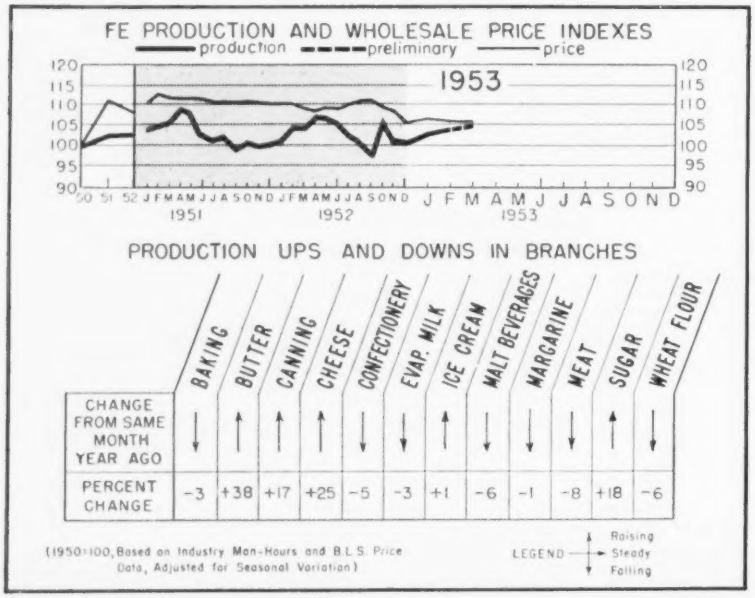
Spanish red pineapple, grown in Cuba, will now be processed into sliced crushed grades by Florida Fruit Canning Co.

The operations will be carried on at the company's new 12,000-sq.-ft. plant at Riviera Beach, Fla. Production is to be launched this month and built up to a capacity of two carloads an hour, employing 70 to 80 woman operatives.

Sliced product will go in No. 2 cans and other sliced and the crushed in No. 10 cans. Sales will be through brokers.

Heading the company is Hernan Henriquez, who operates a similar pineapple plant in Havana. The fruit will be shipped in from Cuba, after first sorting for size, and will be unloaded onto railroad cars at West Palm Beach docks and transferred to the plant's own siding. The smaller Florida pineapple (sugar loaf grown near Miami) is not to be used.

Future company plans call for production of pineapple juice and also finding a Florida fruit for processing during the off-season.



Honor Candy Technologist

Hans F. Dresel of Felton Chemical Co., Philadelphia, has been selected to receive the third annual Stroud Jordan Award given by American Assn. of Candy Technologists.

Mr. Dresel was cited for his untiring efforts in promotion of interest in candy technology. He was particularly recognized for his work for the American Assn. of Candy Technologists and for the highly successful production conferences of the Pennsylvania Manufacturing Confectioners' Assn. at Lehigh University.

Presentation will be made during the fifth annual meeting of the group on June 17 at the Waldorf-Astoria Hotel, New York City.

Hors d'Oeurves

► Heinz is adding nutritional iron to baby cereal. Maybe it will steel the tots to the vicissitudes of life.

► Beer exposed to the British A-bomb explosion was found OK to drink afterwards. Now you know what to keep in your bomb shelter.

► They say the messy butter situation would be solved if every consumer ate an extra pat a day. Simple, what? Too bad it isn't realistic.

► Many parents shuddered when price control was taken off milk. Little wonder! Twenty years is a long time to remember how prices behave in a free competitive market.

► Hungry for a new dish? Try the Air Force's emergency Arctic concoction—boiled mice and wooly lousewort stew. Don't know how it tastes, but it could do with a better name.

► In energy value, 1 lb. of peanuts equals 4 lb. of steak, 21 lb. of cheese, 10 qt. of milk, or 33 eggs. Nutritionally, it's the nuts.

► Battelle is test-tubing sea-water algae into food. One pound is equivalent to two pork chops, ¼ lb. of butter, and a heaping tablespoon of sugar in protein, fat, and carbohydrate content. Hope we never get hungry enough to eat it.

Device Quickly Checks Fumigation Efficiency

Of interest to commercial fumigators and food handling concerns is a new USDA developed instrument seen as an easy means of determining distribution of fumigant. Applicable in buildings, freight cars, or chambers, it will quickly indicate whether the dosage is high or low, and if the commodity is properly aerated.

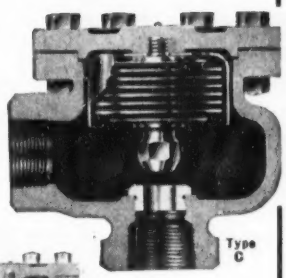
Concentration of methyl bromide at any selected point can be determined in 30 sec. with use of the portable in-

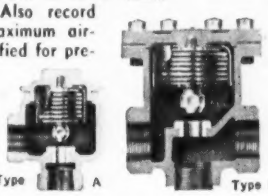
LEADING PROCESSOR

SHORTENS OPERATION from 65 to 45 Min.

→ with Nicholson Steam Traps

Records of a recent installation of Nicholson steam traps, by a large processor, show they cut cooking time 30%; e.g., one operation was shortened from 65 to 45 min. Nicholson units keep equipment full of live steam because: 1) they operate on lowest temperature differential: 2) have 2 to 6 times average drainage capacity. Also record low for steam waste; and maximum air-venting capacity. Widely specified for preventing damage to thin gauges; eliminate cold blow in unit heaters.





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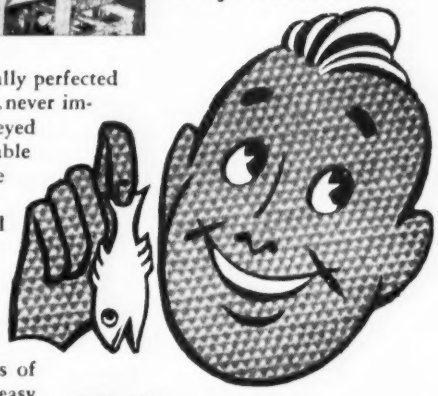

Suprene Belting has been carefully perfected to help foods stay wholesome...never imparts any taste or odor to conveyed products. Made of tough, durable duck and impregnated with the exclusive Victor "Neoprene" compound, Suprene has proved of inestimable value in the packing, processing and manufacture of food products.

Suprene Belting is not only waterproof, but is also highly resistant to the injurious effects of fats, greases and fruit acids. It is easy to wash with steam or hot water. Specify Suprene Belting for all your conveying needs and be sure of safe, sanitary conveyance for years. Send for bulletin 20—it's free.

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Klenzade Flash-Kleen is ideal for steam cleaning jobs. Strips "baked-on" soil residues quickly with the Klenzade Steam Cleaner.

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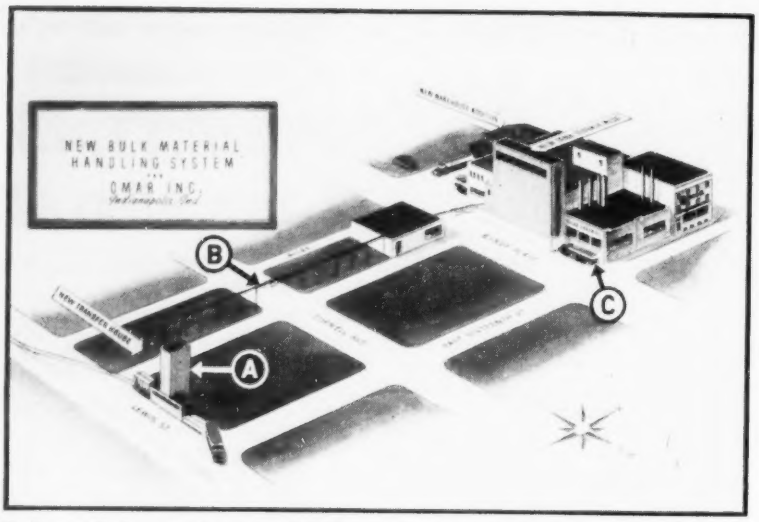


Bulk to Bakery—Speedy A-B-C

Equipment is now being installed at Omar's Indianapolis bakery for bulk handling of the major raw materials—flour, granulated sugar, dextrose, lard, and shortening. Transfer tower (A) will enable unloading of covered hopper cars (designed by Illinois Central RR) in a matter of minutes. To be housed in tower are a telescopic unloading nozzle, sifter, Entoleter, and automatic scales. A 5 in.-dia., 600 ft.-long Fuller pneumatic conveyor (B) will connect railroad siding with bakery. And at (C) liquid ingredients—including melted shortening—will be delivered directly to bakery in tank trucks. Silos for storing flour, granulated sugar, and dextrose will be located in a new section which Omar now has under construction.

strument, which is termed relatively inexpensive. Usual chemical analysis runs upward of 30 min.

Principle of the electric resistance thermometer is used. A gas sample from any point in the fumigation room is drawn through a sampling tube, where it causes a change in the current flow through a filament, according to its concentration. This is then registered on a galvonometer scale.

Change in current flow is caused by cooling of filament, which reduces its electrical resistance. And, the amount of cooling depends upon the thermal conductivity of the gas.

The apparatus has been calibrated so the scale reading can be quickly converted to ounces of methyl bromide per 1,000 cu. ft. By arranging tubes in series, a number of sampling points can be checked in rotation.

USDA says that with adjustments apparatus can be used to test gases other than methyl bromide, and hence projects by commercial manufacturers are invited. Maker of experimental models, The Gow-Mac Instrument Co., 22 Lawrence St., Newark 5, N. J., is now preparing to put the methyl bromide analysis set on the market, according to Randall Latta, chief of Division of Stored Product Insect Investigations.

★ ★ ★

Wins FOOD ENGINEERING Award For Painless Kill Process

To Geo. A. Hormel & Co., Austin, Minn., meat packer, goes the honor of making the most outstanding current achievement in food technology —a revolutionary method of putting hogs to sleep prior to slaughter.

This process has been accorded the biennial 1953 Food Engineering Award by a committee of 26 outstanding food technologists headed by Dr. Samuel Cate Prescott, famous MIT food scientist.

Sponsored by Food Engineering, the Award will be presented to Hormel at the annual meeting of the Institute of Food Technologists in Boston, June 22.

Hormel's award-winning process (Oct. FE, '52, p. 90) involves the use of carbon dioxide gas to immobilize the animals as they are conveyed through a tunnel. This enables workers along the conveyor to easily shackle one hind leg of each hog to an overhead rail conveyor. This conveyor carries them head down to the painless sticking operation.

The animals formerly were put into a narrow pen, and workers had to grab a leg and shackle it as the animal kicked and squealed. This not only was noisy, dirty, back-breaking work,

but it excited and fatigued the animal and possibly affected meat quality.

The new technique also assures more accurate sticking, increases animal respiration to effect higher blood recovery, and permits more uniform and efficient movement of animals into and through the plant.

Says Flash Heat Degrades Frozen Juice Concentrate

Quality of frozen juice concentrate is jeopardized by flash-heat treatment that is aimed to get fullest, most economic juice production, according to a recent statement by Dr. Ralph L. Miller, research director of Plymouth Citrus Products, Lakeland, Fla.

He sees continuation of such flash heating as eventually reducing the product to a "cooked, pasteurized concentrate." And this, he feels, will "doom the citrus business" by sending it back to the status it suffered before the fresh orange concentrate days.

More efficient reaming and additional pressure on the fruit gets more gallons of juice per box, Dr. Miller points out. But this juice contains more peel-like substances, giving a tendency to gellation and separation. To prevent this, the practice of heating the juice to 150-160 deg. F. prior to concentration was introduced. And this, holds Dr. Miller, causes quality-degrading changes in the fresh juice.

Correction

Through an accidental transposition, two photo captions were misplaced in the Packaging Special section of the April FE. Caption for the righthand picture on p. 98 should have been under the righthand picture on p. 99, and vice versa.

USDA Grade Standards

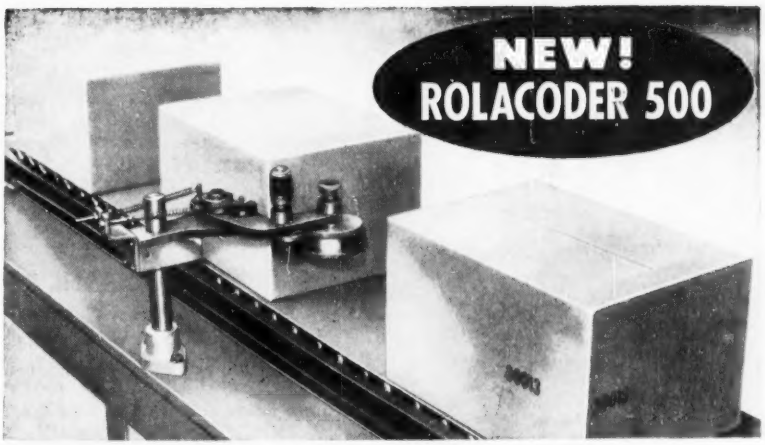
Recent actions by Production & Marketing Administration, USDA, on U. S. Grade Standards:

Frozen squash (summer type), correction, p. 1463, Mar. 14 *Federal Register* (correcting misprint on p. 1182, Mar. 3 *Federal Register*).

Egg grading, regulations amended to give Administrator greater discretion in program, and to increase fees to keep services on a self-supporting basis, p. 1463, Mar. 14 *Federal Register*, effective Apr. 1.

Collard greens and broccoli greens, new, p. 1491, Mar. 17 *Federal Register*, effective Apr. 16.

Nonfat dry milk solids, amendment, proposed, p. 1692, Mar. 25 *Federal Register*, written comments received until Apr. 24. (Would permit 32.5 mg. scorched particle content in place



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Now you can imprint lot numbers or code-dates on *two* sides of cases . . . *simultaneously* . . . as they pass through sealer or along conveyor. New Rolacoder 500 Imprinter saves cost of stencilling or rubber-stamping . . . gives you *two* marks to facilitate identification of cases when stacked or palletized. Friction-operated, self-inking. Copy changes made in minutes.

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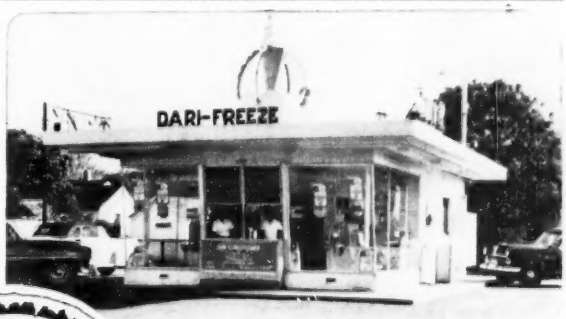

Built into Frick Air Conditioners are 100 Years of Engineering Experience

This Carvel soft ice cream station is one of two on Long Island, N. Y., cooled with Frick units. Installation by Hallam Engineering and Construction Corp., Frick Distributors at Brooklyn for 35 years.

Frick unit conditioners are a quality product, built for a discriminating trade. They are heavier, run more quietly, and have a much longer life. Larger surfaces and better engineering provide more cooling per dollar. Made in 3, 5 and 7½ h.p. sizes: get the whole story: write

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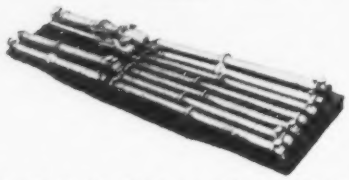
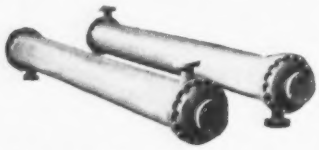


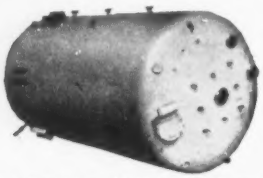
One of six carloads of Heat Exchangers, Coolers, Condensers and Reboilers designed and fabricated by our Heat Transfer Division. Materials used consist mainly of Type 304 Stainless Steel.



Two of four Steel Shell Condensers with Ampco 8 Heads and Tube Sheets. These condensers were built for export to the Middle East.

This condenser is 16" Dia. x 12' tube length; Bundle ¾" O.D. type 316 Stainless tubes; Double tube sheet also of type 316 . . . manufactured by the Heat Transfer Division of DOWNINGTOWN.

One of two all-Aluminum units fabricated by DOWNINGTOWN IRON WORKS, INC. (Welding was performed by the Inert - Gas - Metal - Arc method.)



One of 4 Fermentors, 12'0" x 22'7" high tangent, 10% Stainless Clad, type 304 Stainless . . . manhole body and connections type 304 Stainless. Each fermentor equipped with coils of 3" O.D. x 14 ft. tubing . . . type 304 Stainless.

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of 22.5 now permitted in extra grade roller process.)

Fresh shelled lima beans for processing, revised, proposed, p. 1692, Mar. 25 *Federal Register*, written comments received until Apr. 24.

Frozen asparagus, revised, proposed, p. 1692, Mar. 25 *Federal Register*, written comments received until Apr. 24.

FDA Food Standards

Poly Bread Emulsifiers: On Apr. 6 the Supreme Court denied two petitions for writ of certiorari in the bread standard case which had been decided against Atlas Powder Co. and Glyco Products Co. in the Third Circuit Court of Appeals last December.

A similar appeal is still pending before the Eighth Circuit Court, filed by Research Products Co. of Kansas City. However, the Government has filed a motion there to affirm the Administrator's order and to dismiss Repco's petition.

Those familiar with the legal aspects of this case have predicted that the Eighth Circuit Court will probably grant the Government's petition, thus bringing to a close a chapter in the controversy over use of chemical emulsifiers in standardized bread.

Atlas Powder Co. hopes that "a definite scientific solution to the problem can be reached in the fairest manner to all concerned," basing its optimism on additional research data and on the scientific evaluation of emulsifiers now pending in the National Research Council. And the company will continue to supply users pending final decision.

However, Commissioner Crawford of Food & Drug Administration, stated on Apr. 7 that FDA believes "these chemical softeners should be withdrawn from all food until safety is proved, and until it is shown, if it can be shown, that their use does not deceive consumers". Pending a decision in the Eighth Circuit Court, FDA "enforcement action could not be effective" against continued use of these emulsifiers in standardized breads, Mr. Crawford said.

Plant Inspection: Hearings on proposed bills to restore authority for FDA factory inspection were to be conducted by the House Committee on Interstate & Foreign Commerce as this issue went to the printer. Rumors of some industry opposition have been heard, but majority sentiment seems to favor restoration of authority.

Pesticide Bill H.R. 4277. Rep. A. L. Miller (R., Neb.) introduced on Mar. 26 his "Pesticide Residue Amendment" to the FDC Act (FE Mar., p. 127). It proposes that a new pesticide's residue must be shown to be harmless. Also called for: Coordination of Insecticide, Fungicide & Rodenticide Act; separate consideration of pesticides from chemicals used in food processing; and court review of administratives decisions.

Procedure Simplification: A bill to simplify food standards making procedure was expected to be introduced in the House after the Easter recess. It would propose amending section 401 (b) of the FDC Act as follows:

"(b) All action issuing, amending or repealing any regulation contemplated by this section shall be upon a proposal made either by the Administrator on his own initiative or by petition of any interested person showing reasonable grounds therefor. The Administrator shall publish such proposal and shall afford all interested persons an opportunity to present their views thereon, orally or in writing as he may determine. As soon as practicable thereafter, the Administrator shall by order make public his action upon such proposal. At any time prior to the 30th day after such action is made public, any person adversely affected by such order may file objections thereto specifying with particularity the provisions of the

Schedule of Events

May

11-13—Millers' National Federation; Edgewater Beach Hotel, Chicago.
18-21—Assn. of Operative Millers; Hotel Nicollet, Minneapolis.
18-22—Materials Handling Exposition; Convention Hall, Philadelphia.
24-28—American Assn. of Cereal Chemists annual convention; Hotel Statler, Buffalo, N. Y.
27-29—American Society for Quality Control annual convention; Convention Hall, Philadelphia.

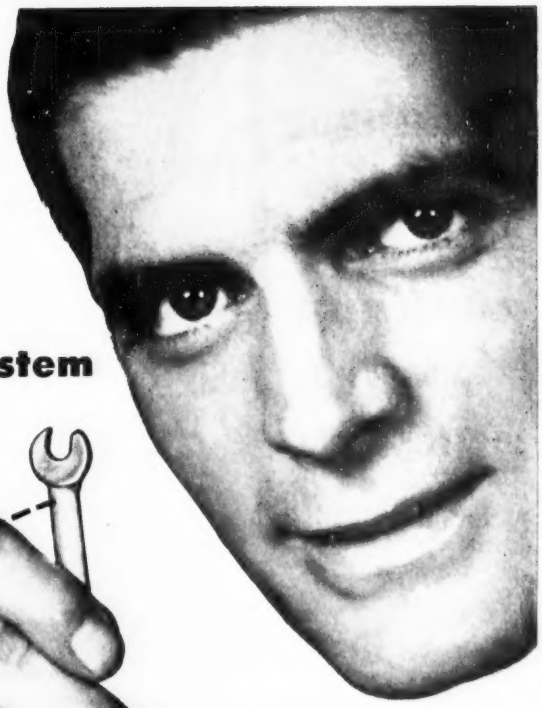
June

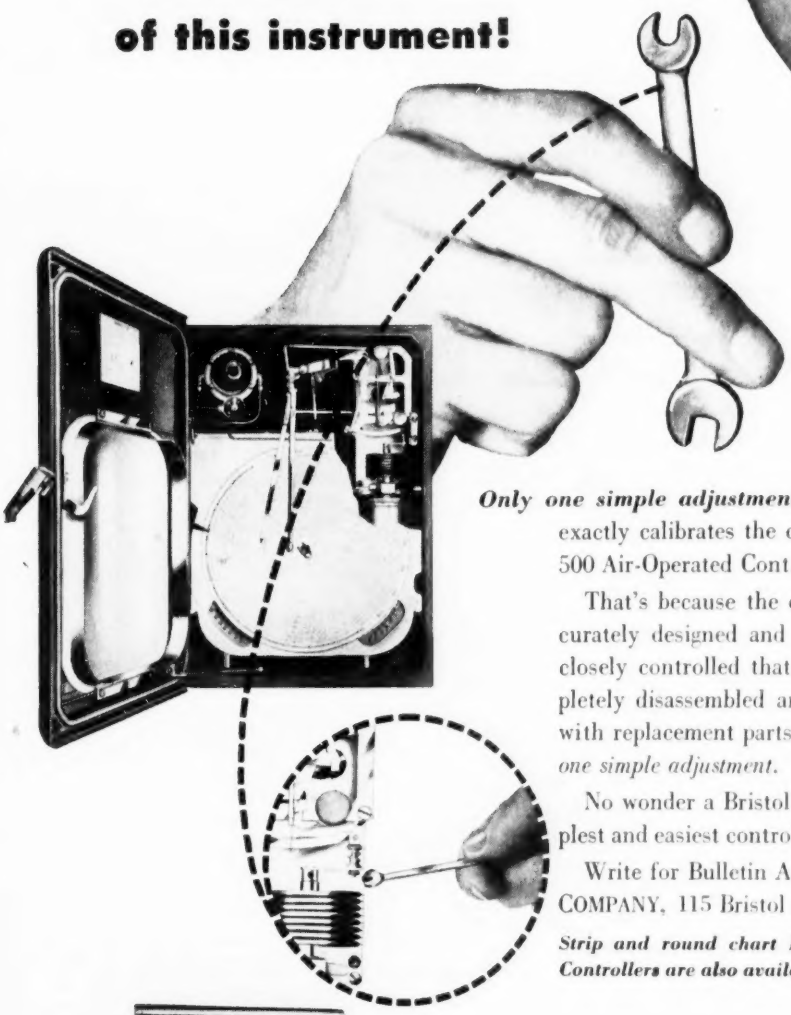
9-10—National Conference on Interstate Milk Shipments; Statler Hotel, St. Louis, Mo.
14-18—National Confectioners' Assn. annual convention, and (16-18) Confectionery Industries Exposition; Waldorf-Astoria Hotel, New York City.
15-19—Exposition of Basic Materials for Industry; Grand Central Palace, New York City.
21-25—Institute of Food Technologists annual meeting and FE Award; Hotel Statler, Boston.
22-24—American Dairy Science Assn. annual convention; U. of Wis., Madison.
22-24—Grocery Mfrs. of America; Greenbrier, White Sulphur Springs, W. Va.
22-26—2nd. International Congress on Food Distribution; Ostend Kursaal, Ostend, Belgium.
22-26—13th International Dairy Conference, The Hague, Netherlands.
23-25—National Macaroni Manufacturers Assn.; Hotel Broadmoor, Colorado Springs, Colo.
29-J1—National Dairy Council annual Summer conference; Edgewater Beach Hotel, Chicago.

July

9-10—National Kraut Packers Assn. annual meeting; Catawba Cliffs Beach Club, Port Clinton, Ohio.
16-17—National Pickle Packers Assn. Summer meeting; Drake Hotel, Chicago.
27-31—American Oil Chemists' Society edible oil short course; Texas A&M College, College Station, Tex.

Here's the only tool you need to exactly calibrate the control system of this instrument!





Only one simple adjustment with a standard ¼ in. wrench exactly calibrates the control system in a Bristol Series 500 Air-Operated Control System.

That's because the control units and parts are so accurately designed and the manufacturing tolerances so closely controlled that the control system can be completely disassembled and after being reassembled, even with replacement parts, can be *exactly calibrated by only one simple adjustment.*

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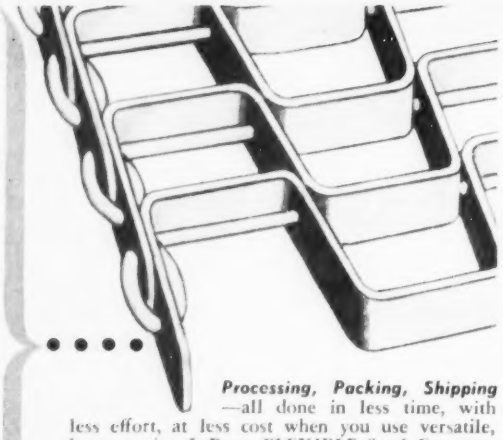

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LaPorte's Flexible Steel construction prevents *creeping, weaving* or *jumping,* by providing a tighter grip on the friction drum. This also assures a perfectly flat surface for containers, empty or filled . . . results in a smooth, steady flow of products through every process from loading bin to shipper. Open mesh feature also permits circulation of air and liquids around products in process — simplifies cleaning and sterilization. Highly resistant to heat and cold. Available in any length, practically any width.

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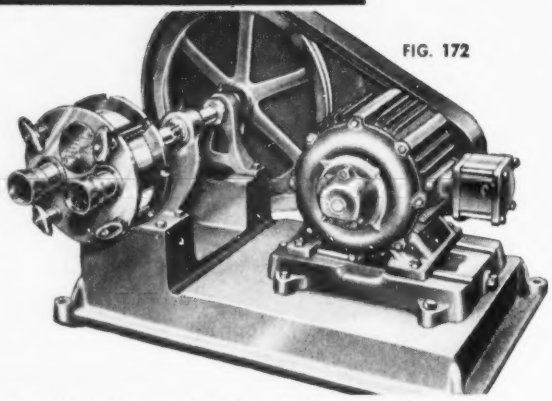

FIG. 172

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order deemed objectionable, stating the grounds therefor, and requesting a public hearing upon such objections. The Administrator shall, thereupon, after due notice, hold such a public hearing for the purpose of receiving evidence relevant and material to the issues raised by such objections. As soon as practicable after completion of the hearing, he shall, by order, make public his action on such objections and such order shall be based only on substantial evidence of record at such hearing and shall set forth, as part of the order, detailed findings of fact on which the order is based. Any order determining any issues raised by objections duly filed, shall be subject to the provisions of Section 701(f) and (g). Every order making public the Administrator's action upon a proposal to which no objections are filed, shall become effective on the day following the 30th day after publication of such order. No order determining issues raised by objections filed as herein provided and after a public hearing thereon, shall take effect prior to the 90th day after its publication, except that if the Administration finds that emergency conditions exist necessitating an earlier effective date, then the Administrator shall specify in the order his findings as to such conditions and the order shall take effect at such earlier date as the Administrator shall specify therein to meet the emergency."

This was the proposal made by M. F. Markel, Washington attorney and former FDA presiding officer in early food standards hearings, when he spoke to the section on food, drug, and cosmetic law of the New York State Bar Assn. Feb. 20. Considerable support for the proposal appears to have grown up. Sympathetic action by the Senate is anticipated if the House should pass such a bill.

Name Change: The scheduled change from "Federal Security Agency" to "Department of Health, Education, and Welfare" in mid-April will probably not expedite administrative action on food standards dockets.

—End—

New Sampling Table

—Continued from page 93

of 100 the value would fall between 69 and 81. Five times out of 100 it would fall outside this range.

Thirty-Hamper Sample: 95 times out of 100 the value would fall between 71.6 and 78.4. Five times out of 100 it would fall outside this range.

From the above it can be seen that, the larger the sample, the greater the precision anticipated, all other factors being equal.

However, since a grower would bring many loads to the factory during a season, it would be anticipated that even with 3-hamper random sampling variations in grades would balance out somewhat—a high estimate cancelling a low one.

But if a device were available to sub-sample each hamper, more hampers could be used and the resulting sample would more nearly represent the quality of tomatoes in a load. It

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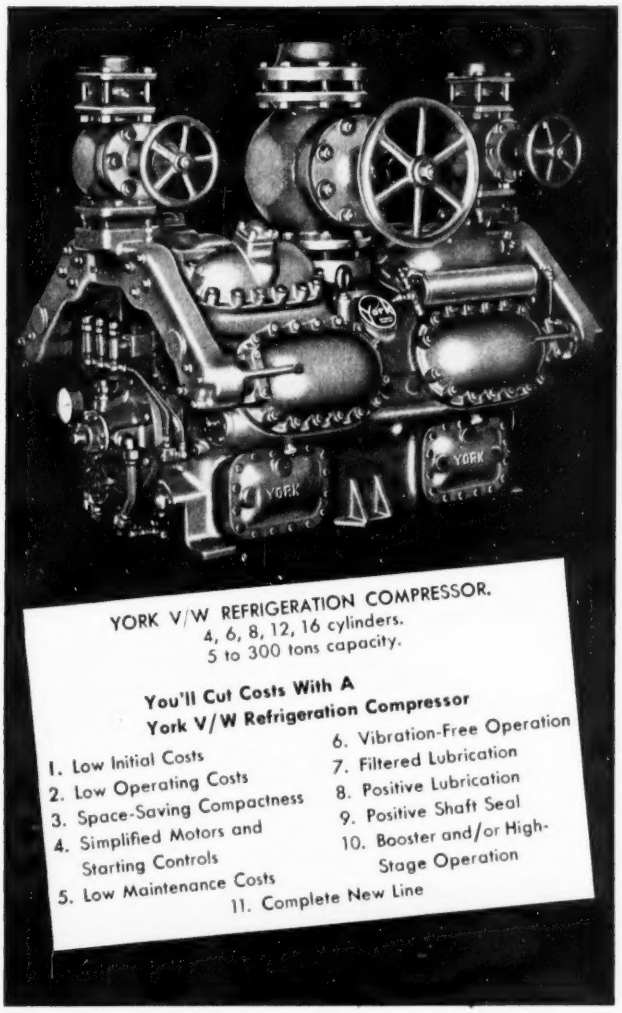

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was desired to obtain a 10 percent sample from each hamper.

In trials with disks of aluminum foil, a diameter of 4½ in. was found to be the most suitable size for trap-door sampling areas, and a total area 27 x 27 in. was decided on as a good compromise between large and small hampers.

Using these dimensions, there was initially constructed a table whereon were placed nine aluminum disks to represent holes. Then a hamper of tomatoes was dumped onto it and the fruit distributed evenly over the surface. Those thought to fall through a hole equal to the diameter of the disks were removed by hand.

In order to evaluate this system, studies were undertaken employing four hampers of tomatoes as a sample. Four sub-samples were obtained. Weights of various samples and sub-samples were recorded. The average sub-sample weighed 3.4 lb., amounting to 11 percent of the average total hamper weight.

In addition, the 4-hamper sample was evaluated for color as a unit. Therefore, if the color of the sample and sub-sample were related, this would give added significance to the system. Assuming uniform distribution of defects, sample and sub-sample pulping were independent, without trimming. Color for each was then measured on the Hunter meter.

Fig. 2 indicates relationship between color of 4-hamper samples and sub-samples obtained therefrom. There was excellent agreement between the color of the sample and sub-samples since a correlation coefficient (r) of 0.97 was obtained.

Holes Replace Disks

Another table was now constructed of the same dimensions and having trap doors released by a simple lever. In operation, a hamper is emptied onto this table and after spreading fruits over the surface, trap doors are released and free tomatoes fall onto a burlap sling and into the sub-sample hamper.

The table is provided with a gate and a pouring spout, and it is so designed that the tomatoes remaining (after removing the sub-sample) may be dumped quickly and easily into the original hamper, or directly into a flume or washer.

Number of hampers to be sub-sampled from a load of a given size would depend upon the degree of precision desired. The table as designed selects an 11 percent sample. From nine to ten hampers would therefore be required to obtain one hamper of sub-sample tomatoes. It is anticipated that one such hamper

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would yield information necessary to assign a grade value to loads ranging from 150 to 400 hampers.

Although more time is required to obtain the sub-sample to be graded, the total number of tomatoes inspected is greatly reduced. There is no reason why more than one load could not be sub-sampled at the same time. The receiving hamper could be removed, and another put into its place for a different lot being unloaded at the cannery at the same time.

The above feature story is designated Journal Paper No. 675 of the Purdue Agricultural Experiment Station, and is published with approval of the Station director—The Authors.

End (Resume reading on page 94)

Corn Syruped Fruits

—*Continued from page 133*

definitely shown that samples of fruits containing blended corn and sucrose syrups (50-50 on a dry basis) were equal in flavor to those with straight-sucrose syrup. Samples containing one-third of corn syrup in a blended sweetener could not be distinguished from those packed in straight-sucrose syrup.

Majority of the testers reported a very favorable fruit flavor with samples containing blended syrup. Also, color of the fruit was termed much brighter and more glistening than when only sucrose was used. And firmness of the defrosted fruit was considered to be improved.

Penetration of sugars and corn syrup made the fruit plumper when defrosted, improved texture from an appearance standpoint, and enhanced taste. Uniformity of natural fruit flavor was more evident in blended syrup packs than it was in the all-sucrose packs.

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End (Resume reading on page 133)

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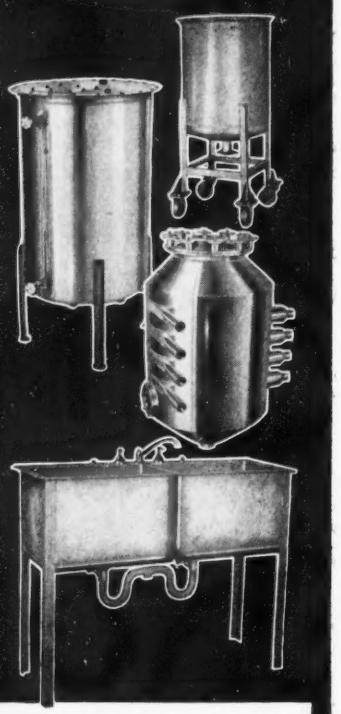

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Butter Made Continuously by Destabilizing, Separating, Blending, Cooling, Crystallizing—*H. C. Horneman and S. N. Quam, Danville, R. V. Hussong, Urbana, Ill. and B. W. Hammer, Sarasota, Fla. to Cherry-Burrell Corp., Chicago. No. 2,630,388. March 3, 1953.*

Palatable Protein Product From Whey Made by Removing Inorganic Salts by Electrodialysis—*A. H. W. Atten, Hilversum, and S. G. Wiechers, The Hague, Netherlands to de Nederlandsche Centrale Organisatie Voor Toegepast-Natuurwetenschappelijk Onderzoek, The Hague. No. 2,631,100. March 10, 1953.*

Edible Shredded Coconut Product Containing About 8 Percent Sorbitol, and Small Amount of Propylene Glycol—*P. L. Welker and S. J. Woodruff, New York, R. J. Boddington, Cranford, N. J., to The Glidden Co., Cleveland, Ohio. No. 2,631,104. March 10, 1953.*

PROCESSES

Quick Freeze Method Employing Intermittent Movement of the Package Against Freezing Surface With Attendant Application of Pulsating Pressure—*R. M. Magnuson, Campbell, Calif. No. 2,625,805. Jan. 20, 1953.*

Preparing Molten Gelatin Solution From Water-Impregnated Gelatin by Hermetically Sealing, Drawing off Air, Subsequently Heating—*J. O. Scherer to R. P. Scherer Corp., Detroit, Mich. No. 2,628,916. Feb. 17, 1953.*

System for Producing, Working, and Crystallizing Butter by Neutralization, Destabilization, Centrifugal Separation, Vacuum Pasteurization, With Metered Mixing and Crystallizing Chamber—*I. J. Lundal and R. P. Robichaux, to Cherry-Burrell Corp., Chicago. No. 2,630,059. March 3, 1953.*

System for Carrying Out Physical-Chemical Reaction on Milk Comprising Vat, Agitating Type Heater With Closely Coupled Separator, Mixing Chamber, Cooling and Stabilizing, and Tempering Units—*H. C. Horneman and S. N. Quam, Danville, R. V. Hussong, Urbana, Ill. and B. W. Hammer, Sarasota, Fla. to Cherry-Burrell Corp., Chicago. No. 2,630,060. March 3, 1953.*

Treating Liquid Egg Whites by Fermenting Through Alkaline, Neutral, and Acid Stages, Separating Scum, Acidifying—*A. K. Epstein, and B. M. Shaffer, to The Emulsol Corp., Chicago. No. 2,630,387. March 3, 1953.*

Drying of Vegetables by Cooking Unpeeled, Reducing Moisture Content by Mixing With Dry Powder of Same Vegetable, Removing Skin, Eyes, and Other Foreign Matter, Heat Drying—*R. A. S. Templeton to The Farmers Marketing & Supply Co. Ltd., London, England. No. 2,630,391. March 3, 1953.*

Continuous Treatment of Flour and Other Ground Products With Chlorine Dioxide Gas by Metered Addition of Aqueous Solution While Flowing an Inert Gas Through the Stream—*A. Kleijn and H. J. Houtgaaf, Rotterdam, Netherlands, said Houtgaaf to said Kleijn. No. 2,630,392. March 3, 1953.*

Producing Smooth Liquid From Combination of Disseminatable Solid Material and Liquid By Centrifugal Mixing and Particle Disintegration—*J. C. Monk, San Francisco, and P. F. Sharp, Piedmont, Calif. to Golden State Ltd., San Francisco. No. 2,631,101. March 10, 1953.*

Deaerating and Deoiling Citrus Juices by Collecting Vapors From Partial Vacuum Evaporation, Removing Gases, Separating Oils, Returning Residual Condensate to Continuously Circulating Juices—*M. J. Kermer, Buffalo, N. Y. to Blaw-Knox Co., Pittsburgh, Pa. No. 2,631,103. March 10, 1953.*

Evaporating Milk in Multiple Effect Evaporator by Establishing Constant Temperature Gradient Between Effects to Avoid Coagulation of Components—*R. O. Henszey, Oconomowoc, Wis. No. 2,631,105. March 10, 1953.*

EQUIPMENT

Apparatus for Transferring Cans Pneumatically Through Elongated Stationary Tube—*C. J. Smith, Rockford, Ill. No. 2,624,641. Jan. 6, 1953.*

Machine for Automatically Disengaging Frozen Confections From Molds in Continuous Conveyor—*R. F. Eddy and A. F. Eddy, San Marino, Calif. No. 2,625,120. Jan. 13, 1953.*

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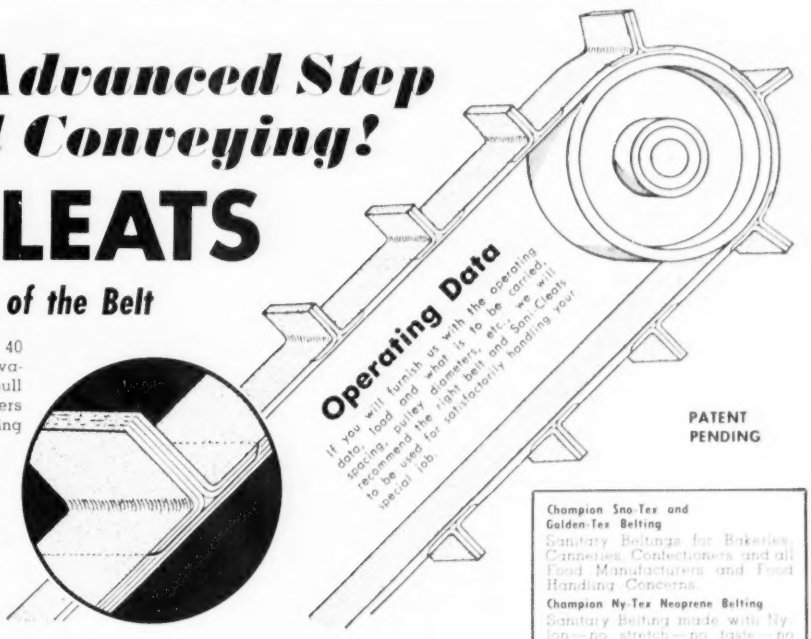
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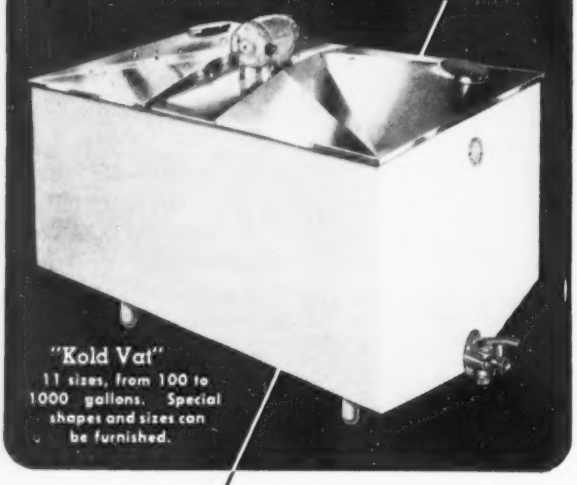

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Egg Room Integrated Conveying and Packing Equipment System Employing Endless Conveyor and Plurality of Work Stations—*J. W. Cox to Shellmar Products Corp., Chicago. No. 2,625,309. Jan. 13, 1953.*

Apparatus for Eviscerating Shrimp on Endless Conveyor With Gripping Chucks and Slitting Saw—*A. J. Avetta and T. Scardamalia to A. J. Avetta, Pittsburgh, Pa. No. 2,625,705. Jan. 20, 1953.*

Apparatus for Orienting Fish for Beheading—*N. L. Oates to Smith Cannery Machines Co., Seattle, Wash. No. 2,625,706. Jan. 20, 1953.*

Poultry Suspending Device Comprising Conveyor Borne Strut-Suspended, Spring-Urged Set of Jaw Assemblies for Leg Clamping—*J. M. Liittjohann, Des Moines, Ia. No. 2,625,707. Jan. 20, 1953.*

Meat Shaping Apparatus Comprising Tubular Mold With Means for Exerting Pressure on Contents—*C. A. Hammerburg, Des Plaines, Ill. to Armour and Co., Chicago. No. 2,625,876. Jan. 20, 1953.*

Machine for Sugar Sanding Confections Employing Spiral Conveying Device for Feeding Products to and Through Unit—*J. Opie, Riverside, Ill. No. 2,625,903. Jan. 20, 1953.*

Oven Conveyor With Guided Trays Maintained in Horizontal Position—*W. P. Schonwald, West Haven, Conn. to American Machine & Foundry Co. New York. No. 2,626,700. Jan. 27, 1953.*

Apparatus for Manufacturing Ice Cream Cake Confection Employing Rotating Trough and Stationary Saw Blades—*P. M. Angell and W. J. Benn to Newly Weds Baking Co., Chicago. No. 2,627,236 and No. 2,627,237. Feb. 3, 1953.*

Attrition-Type Flour Mill With Centrifugally Controlled Feeding Means—*R. Lee, Elm Grove, Wis. to Lee Foundation for Nutritional Research. Milwaukee. No. 2,627,376. Feb. 3, 1953.*

Candy Wrapping Machine Employing Rotary Carrier With Pockets and Feeder Mechanisms for Wrapping Material—*T. F. Schlicksupp, Long Island City, N. Y. No. 2,627,709. Feb. 3, 1953.*

Pumping Apparatus for Delivering Two Liquids in Preselected Proportions—*V. J. Gilmore, Wappingers Falls, N. Y. to The De Laval Separator Co., New York. No. 2,627,813. Feb. 10, 1953.*

Apparatus for Folding Dough Sheets Into Layers Employing Parallel Transverse Feeding Belts—*F. H. Hubbard, Indianapolis, Ind. No. 2,627,822. Feb. 10, 1953.*

Clover-Leaf Roll Former Employing Reciprocal Die Bearing Plate and Stripping Means—*L. A. Hurley and P. F. Lucas to L. D. Houlis, Dallas, Tex. No. 2,627,523. Feb. 10, 1953.*

Apparatus for Dehydrating Fruit and Vegetable Juices by Spraying Into Series of Rotating Refrigerated Cylinders—*H. A. Toulmin, Jr. to The Commonwealth Engineering Co. of Ohio, Dayton. No. 2,628,485. Feb. 17, 1953.*

Meat Curing Liquid Pump Apparatus Employing Mobile Manifold With Hollow Penetrating Needles—*T. A. D. Jones, and C. E. Kilby to Kingan & Co., Indianapolis, Ind. No. 2,628,552. Feb. 17, 1953.*

Ice Cream Cone Rolling Machine Employing Rotary Frame and Plurality of Molds With Wafer Heating Grids and Means for Scraping Wafers Through Feed Slots Into Molds for Automatic Rolling—*J. S. Finke, University City, Mo. No. 2,628,576. Feb. 17, 1953.*

PACKAGING

Container for Frozen Stick Confections With Inclined Bottom Flaps That Engage Stick Handle—*J. Valenta, Los Angeles, Calif. No. 2,627,472. Feb. 3, 1953.*

Food Package With Insertable Rack for Uniformly Impaling Products Such as Olives and Cherries—*G. W. Stiehm to Jewett & Sherman Co., Milwaukee, Wis. No. 2,628,914. Feb. 17, 1953.*

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Top Sealing Apparatus Employing Anvil Sealing Member Carried by Conveyor and Vertically Moving Pressure Member—*J. Riemer to Kraft Foods Co., Chicago. No. 2,629,997. March 3, 1953.*

Method of Packing Fish Materials in Containers by Compressing Into Cakes Which Allow Room for Oil Addition—*E. H. Carruthers, Warrenton, Ore. No. 2,630,390. March 3, 1953.*

Selective Assembler and Carton Filler—*P. E. Slightam, Chicago to General Mills, Inc. No. 2,630,951. March 10, 1953.*

Container Closing Machines—*H. A. Barnby, Olav Bjering, and J. Hohl, Toledo to Owens Illinois Glass Co. No's. 2,630,952; 57; 58 respectively. March 10, 1953.*

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● A deadly weapon against germs and insects is an aerosol fog. Its microscopic particles penetrate the smallest cracks and holes, settle lethal doses of insecticides in the darkest corners, where vermin nest. Ordinary sprayers can not do this because the particles are too large. To produce an aerosol fog efficiently and economically, use the MICROSOL* 202. This mechanical fog generator does not use heat or steam (which disintegrate some insecticides). No need for awkward attachments like nozzles and air compressors. The MICROSOL* 202 is entirely portable . . . light, sturdy, easy to operate, no maintenance. Do your exterminating with the MICROSOL* 202. Use it anywhere! Use any kind of liquid germicide, insecticide, deodorant, or humidifier! Use it and see the difference! MICROSOL* units available in many sizes and with many capacities. Ask your insecticide dealer or write for more complete information.

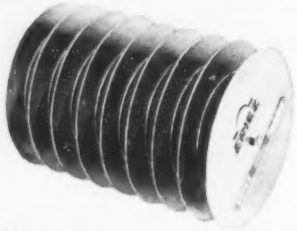
SILVER CREEK PRECISION CORPORATION • Silver Creek, N. Y.

For more information, use coupon on page 159.

it's NEW! IT'S NEWS!

THE ERIEZ PERMANENT NON-ELECTRIC

HOPPER MAGNET



AFFORDS *New* VITAL PROTECTION

For Food • Milling • Chemical Lines

• ERIEZ HOPPER MAGNET . . . for the complete removal of ferrous contamination from grains, pelleted products, chemicals and other free-flowing materials . . . installed where other magnetic assemblies, because of physical or dimensional limitations, cannot be adapted to steeply sloping hoppers.

ERIEZ HOPPER MAGNET . . . the simplest of all magnetic installations . . . merely lay it in the throat of any wood or steel hopper . . . the magnet will pull and hold all tramp iron passing with the material flow!

ERIEZ HOPPER MAGNET consists of a series of steel step-discs spaced with cylindrical shaped, powerful Alnico V magnets. All parts are permanently attached to a non-magnetic tie rod. Constructed in one-inch increments, the Hopper Magnet can be built to any length desired!

Check These ERIEZ Features:

1. Installation is simple . . . merely lower into hopper so that steel discs rest on hopper's sides.
2. No maintenance required other than periodic cleaning of collected tramp iron . . . just pull the unit out and clean with a cloth.
3. Hopper Magnet's core is a series of Alnico V castings, most powerful, economical magnetic element known.
4. Steel-stepped discs provide efficient distribution of magnet field.
5. First cost is last cost . . . no electricity, no wires needed!

and a Companion

NEW • • RUGGED • • PERMANENT

GRATE MAGNET

THAT BRINGS YOU "TRAMP IRON PROTECTION" NEVER BEFORE POSSIBLE!

• The rugged ERIEZ Grate Magnet removes tramp iron from free flowing materials when installed in hoppers, floor openings, vertical closed chutes, etc.

ERIEZ Grate Magnets are available in 162 sizes, from 2½" x 4" to 36½" x 36". Here's protection to valuable equipment and a great help in preventing product contamination. Stops fires and explosions . . . *tramp iron can't get by!*

Send for free bulletin B-204 fully describing these two new magnetic products

ERIEZ MANUFACTURING COMPANY

29 MAGNET DRIVE • ERIE, PENNSYLVANIA

Men & Companies

A. Irving Grass, president of I. J. Grass Noodle Co., was re-elected president of National Soup Mix Assn. for 1953 at that group's seventh annual meeting in Chicago.

Industry

Akron Candy Co.'s equipment and assets have been purchased by Spangler Candy Co. of Bryan, O.

Bowman Dairy Co. has elected Dr. D. B. Peck as board chairman and F. H. Kullman, Jr., as company president.

Canada Packer Ltd.'s new Montreal plant addition will cost an estimated $160,000.

D. L. Clark Co., Pittsburgh candy manufacturer, has acquired plant and facilities of **John Horne Candy Co.,** Evanstown, Ill.

Coca-Cola Bottling Co.'s plant in Mena, Ark., has been sold to Ramon F. Wilson of Nashville, who will continue operation.

Dominion Seven-Up Co., Ltd., Toronto, is building a new plant to replace present factory and offices.

Dr. Pepper Bottling Co. is completing a $300,000 plant in St. Louis.

Fortune Bay Products, Ltd., a joint enterprise of U. S. and Canadian investors, is constructing a $1,000,000 plant in Fortune, Newfoundland, to process and freeze seafood.

Galveston Mills, Inc., Gretna, Virginia flour and feed plant, was destroyed by fire last month.

General Baking Co. has opened a new $500,000 distribution plant in Wilmington, Del.

Hekman Biscuit Co., Grand Rapids, Mich., division of United Biscuit Co. of America, will build a $150,000 office and warehouse in Toledo.

Kraft Foods Co. has begun construction of a dairy products manufacturing and storage plant in Springfield, Ill.

Marshburn Bros., vegetable concern, is building new $350,000 processing plant at Downey, Calif.

Libby, McNeill & Libby is constructing a $156,000 addition to its Sunnyvale, Calif., frozen fruit and vegetable processing plant.

Minute Maid Corp. has dedicated its new Norman V. Hayes Memorial research and development building in Plymouth, Fla.

Pepsi-Cola Bottling Co. will build a new bottling and distribution plant in Kingstree, S. C.

Seven-Up Bottling Co. has begun construction of new $100,000 plant in San Jose, Calif., to be completed next month.

Tea Council of the United States of America, Inc. met for first time recently at its New York headquarters and elected Robert B. Smallwood, president of Thomas J. Lipton, Inc., as president. Anthony Hyde is executive director.

Welch Co., Inc., is new owner of Church Grape Juice Co. of Kennewick, Wash., one of Pacific Coast's largest processors of grapes.

E. J. Stevenson is new president and treasurer of White-Stokes Co., manufacturers of creams, jellies, and confectionery and bakery ingredients. Recently purchased by Harrison Industries, Inc., of which Stevenson is vice-president and treasurer, company will retain Mrs. J. E. Stokes, former president, in an advisory capacity.

William E. Foster has become associated with the American Sanitation Institute. He has been with Sheffield Farms Co., Human's Dairy, and University of Wisconsin.

C. Richard Drescher, former general manager of Phillips Packing Co.'s frozen foods division, has been named vice-president in charge of that section.

Personnel

Buell H. Bedford, president of Bedford Products, Inc., was elected president of National Preservers Assn. at its annual convention in Chicago.

Angelo Campodonico, Jr., is new president of Regal Amber Brewing Co., San Francisco. He succeeds Edward Gunnerson, who is retiring.

D. L. Carpenter has joined research and development department of **Pillsbury** Mills, Inc., at Minneapolis, as director of formulation.

J. J. Creighton has been elected president of National Dairy Council of Canada.

Alvin Griesedieck, president of Falstaff Brewing Corp., St. Louis, has been appointed board chairman. He is succeeded by Joseph Griesedieck.

W. Don Hooper has been elected to board of Hunt Foods, Inc., increasing board to ten members.

James A. Kirkman, Jr., has been elected to board of directors of Red Star Yeast & Products Co.

Eugene G. Laughery has resigned as research director for National Cranberry Assn. to become general manager of Coffee Brewing Institute, Inc.

A. R. MacKenzie has been appointed general manager of Purity Flour Mills Ltd., Toronto.

B. H. Oehlert, Jr., has been named vice-president of Coca-Cola Bottling Co. of N. Y., Inc.

Dr. Joseph L. Owades has joined staff of Schwarz Laboratories, Inc., Mt. Vernon, N. Y., as assistant chief chemist. He will specialize in research and consultation on brewing various foods and biochemicals.

Louis A. Petri, president and general manager of Petri Wine Co., San Francisco, was re-elected president of Wine Institute at the association's annual meeting in San Francisco.

F. B. Schmick is new director of General Bottlers, Inc., Pepsi-Cola bottler and distributor.

Joseph Stenner, former general operating manager of Quaker Oats Co.'s production department, has been transferred to Chicago, where he will supervise company milling operations.

Edwin Traisman, formerly in charge of process cheese research at Glenview laboratories of Kraft Foods Co., has been made head of cheese section.

John Maynard Whittaker has been elected executive vice-

Dr. Samuel Cate Prescott will receive citation at Institute of Food Technologists' annual meeting in June. He will be honored for his distinguished career in application of science to food technology.

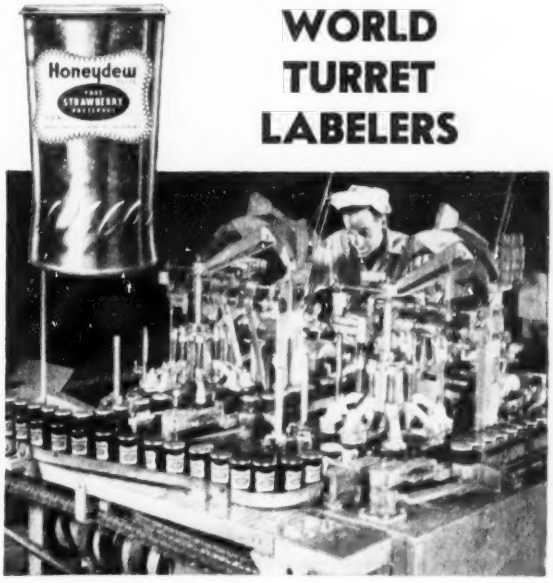
THERE IS NOTHING LIKE A *Satisfied Customer*

The General Preserve Company of Brooklyn, N. Y., a leader in the Preserve Industry for more than 30 years, installed their first World Twin Turret Labeler in 1945. Ever since, for eight years, this packer of a line of outstanding Preserves, Jellies, and Marmalade, has received top labeling production from this machine—at the rate of 168 jars per minute.

The Factory Superintendent of the General Preserve Company says: *"I like the Turret Labeler because it is economical to operate and easy to maintain. I know I can rely on this machine to perform an automatic, clean, precise labeling job on our own HONEYDEW Brand labels and on the many private brands which are packed in our factory."*

Naturally, when production demands increased, General Preserve Company ordered *another* World Twin Turret Labeler.

So many packers in glass from coast to coast are doing the same thing—placing repeat orders for the World Turret Labeler. May we tell you how well it will fill the bill for you?



WORLD TURRET LABELERS

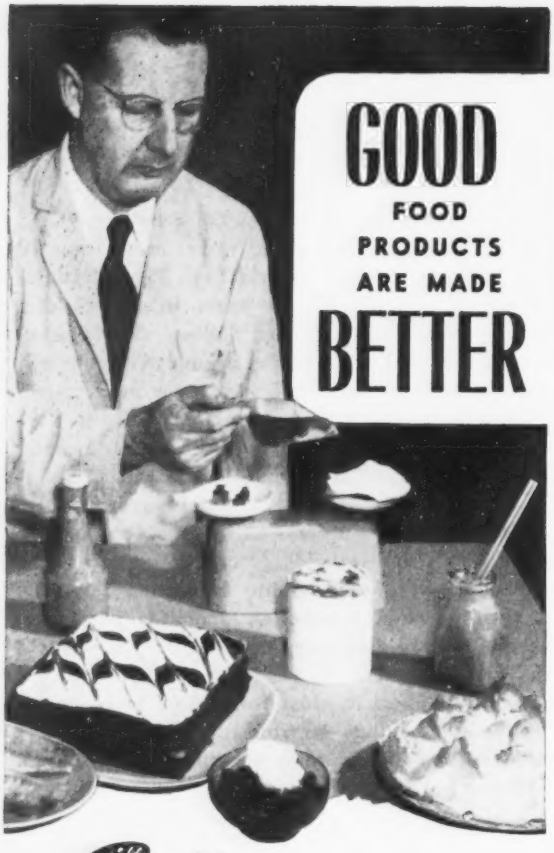
YOU GET THE BEST LABELERS IN THE WORLD

ECONOMIC MACHINERY CO.

54 FREMONT ST. WORCESTER 3, MASS.

DIVISION OF GEO. J. MEYER MANUFACTURING CO.
CUDAHY, WISCONSIN, U.S.A.

For more information, use coupon on page 159.



GOOD FOOD PRODUCTS ARE MADE BETTER

with SeaKem "COLLOIDS OUT OF THE SEA"*

Does your product have all the appetite and sales appeal it needs? . . . Can your manufacturing process be simplified or speeded up? . . . Has a really tough improvement problem got you ready to throw in the towel?

Then it's time right now to discover how SeaKem Stabilizers can help you.

The check list at right shows a few of the positive ways these remarkable colloids are improving dozens of items as widely varied as bakery product stabilizers, chocolate milk, dessert mixes, ice cream stabilizers, pet foods, pie fillings (fruit), puddings, sauces, sausages, and syrups.

Whatever your food product may be, if the function you are interested in is listed, it will pay you to get full information on SeaKem "Colloids Out of the Sea". For prompt, non-obligating recommendations, just write outlining your problem.

Here are a few of the functions being performed by SeaKem Stabilizers for an ever-growing list of food products:

- Binding
- Bodying
- Emulsifying
- Gelling
- Modifying
- Stabilizing
- Suspending
- Thickening
- Custardizing milk and products containing milk solids
- Improving mouth feel and flavor
- Increasing efficiency of component ingredients
- Modifying ice crystal growth
- Physical and anti-oxidant protection

* SeaKem is the registered trademark for the standardized, water-soluble, sea plant extractives manufactured by the Seaplant Chemical Corporation. Refined by rigidly controlled processes which insure dependable uniformity and purity, SeaKem "Colloids Out of the Sea" are light amber to colorless, free-flowing flaky powders. Available in a variety of types suitable for use in either dry or liquid applications, SeaKem Stabilizers have won acceptance on the basis of proven advantages with leading food manufacturers and processors.

Send for latest SeaKem Technical Bulletins

SEAPLANT CHEMICAL CORPORATION
63 David St., New Bedford, Massachusetts

Alan P. Danforth was recently appointed New Products Manager of Snow Crop Division of Clinton Foods. He will oversee research and development of new products as well as those now manufactured.

president of New England Confectionery Co.

Associated Industries

Air Conditioning & Refrigeration Machinery Assn. will soon merge with the **Refrigeration Equipment Manufacturers Assn.**

Borg Warner Corp., Chicago, has named L. G. Porter, R. S. Ingersoll, and Robert W. Murphy as vice-presidents.

Canning Machinery & Supplies Assn. has elected Hal W. Johnson as president for 1953.

Crane Co., Chicago, has elected V. P. Rumely as senior vice-president and L. N. Blugerman as vice-president.

Day Co., Minneapolis manufacturer of dust control equipment, has elected Frederick Ward to its board.

Cherry-Burrell Corp.'s Vice-President Carl Wood has been re-elected president of Dairy Industries Supply Assn.

F. B. Redington Co., cartoning and packaging machinery manufacturer, has appointed Charles L. Barr as vice-president.

Food Machinery & Chemical Corp. has acquired **Milwaukee Equip. Co.**

General Box Co. has announced election of Emil Holzwart as vice-president in charge of production.

Kewanee-Ross Corp. has elected Richard N. Mathews as vice-president.

National Can Co. has elected Donald C. Lillis as chairman of board. He will continue as president.

Monsanto Chemical Co. will enter field of polyethylene plastics manufacture.

Reynolds Metals Co.'s Plant 9 in Louisville, Ky., will be altered to handle all steps in production of aluminum foil.

Shellmar Products Corp., flexible packaging fabricator, has formed Shellmar Papelera Industrial, C. A. in Caracas, Venezuela.

Sharples Corp.'s dairy equipment division's new Eastern manager is John Hassell.

Timken Roller Bearing Co. has begun a multi-million dollar expansion program.

Wagner Electric Corp. has elected W. B. McMillan a director.

Deaths

John H. Barrington, 84, former general manager of Anheuser-Busch yeast plant at Old Bridge, N. J.—Mar. 5.

George H Burdick, 82, retired official of Richmond-Chase Co., packing and canning firm.—Mar. 12.

Chris J. Gambel, 76, president of Henderson Sugar Refinery, Inc., New Orleans.—Mar. 2.

John Harry Filbert, 49, vice-president of J. H. Filbert, Inc., food manufacturer.—Mar. 21.

Mrs. I. J. Grass, 74, one of I. J. Grass Noodle Co. founders.—Mar. 13.

David J. Harrison, 67, president of C. A. Durr Packing Co., Utica, N. Y.—Mar. 19.

Frank H. Langenskamp, 74, board chairman of F. H. Langenskamp Co.—Mar. 15.

Frank Louis Lummis, 74, retired vice-president and general manager of Lummis Peanut Co.—Mar. 2.

Charles A. Messina, 45, head of Orange Canning Co., Orange, Calif.—Feb. 16.

Felix T. Pauly, 75, retired co-owner of Pauly & Pauly Cheese Co., Wis.—Mar. 8.

William F. Piel, 69, president and board chairman of Piel Brothers, Inc., brewers.—April 6.

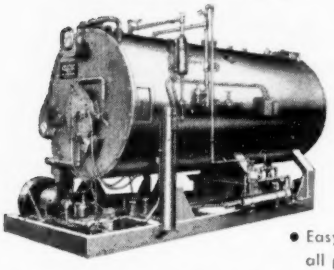
Morris Sayre, 69, president of Corn Industries Research Foundation, Inc.—Mar. 7.

William W. Skinner, 78, chemist and former chief of Department of Agriculture's Bureau of Agriculture & Industrial Chemistry.—Mar. 10.

"Easy to install... Easy to operate... Easy on the fuel!"

AMESTEAM GENERATOR

- A complete unit, piped and wired, ready for service connections.
- Needs no special foundation or expensive stack.
- Fully automatic... attention-free.
- 80% efficiency means real fuel savings.
- Easy to clean and service... all parts accessible.



20 SIZES — 10 to 600 h.p. — 15 to 200# OIL OR GAS

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Complete engineering facts on the exact AMESTEAM GENERATOR to do your job and save you money. Write today!

AMES IRON WORKS

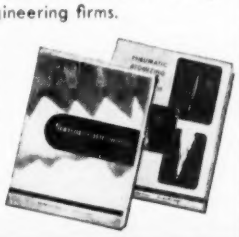
BOX C-53 OSWEGO, N. Y.

when you go courting lower costs

first check the SPRAY NOZZLES used in the system

More exact spray nozzle design...with nozzle capacity better adapted to the character of the liquid being sprayed can often materially improve spraying operations and lower your costs. That's why Spraying Systems Spray Nozzles are worth checking. Thousands of types and capacities to choose from. Designed and built by America's leading spray nozzle manufacturers. The most widely used nozzles in America today among equipment builders and engineering firms.

WRITE TODAY... let us send you General Catalog No. 22 and Pneumatic Atomizing Nozzle Catalog No. 23. Scores of Data Sheets also available covering specialized applications.



SPRAYING SYSTEMS CO.

3212 Randolph Street
BELLWOOD • ILLINOIS

EXIT THE SHOVEL...

ENTER THE *Hapman*

Sealed-pin Chain, Neoprene-flighted

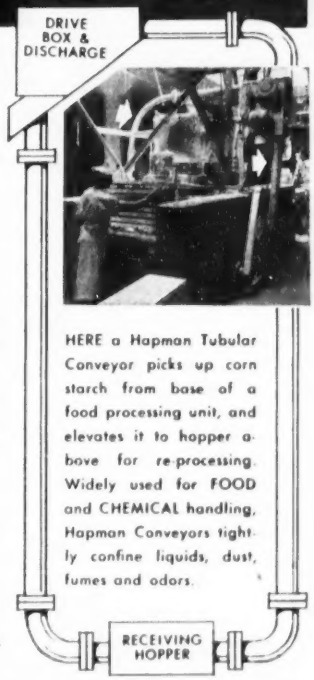
TUBULAR CONVEYOR

for low-cost handling of bulk flowable materials—wet or dry

"Shovel labor" costs *plenty* — so do safety hazards and confusion caused by heavy aisle traffic. But there's a better way — the *Hapman Way!*

By handling innumerable bulk materials with Hapman Tubular Conveyors, you can slash these costs — and increase safety and efficiency! Can you handle metal chips from machine tools? *Yes!* Flour? *Yes!* Abrasive or corrosive chemicals? *Yes!*

Get details NOW — write Hapman, describing your problem. Ask for Bulletin FE-553.



HERE a Hapman Tubular Conveyor picks up corn starch from base of a food processing unit, and elevates it to hopper above for re-processing. Widely used for FOOD and CHEMICAL handling, Hapman Conveyors tightly confine liquids, dust, fumes and odors.

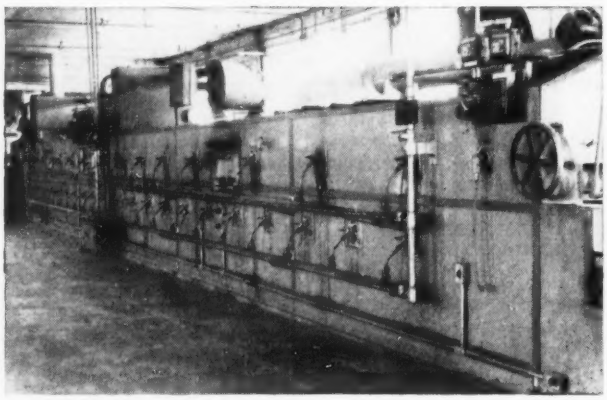
Hapman CONVEYORS, INC.

DIVISION HAPMAN-DUTTON COMPANY

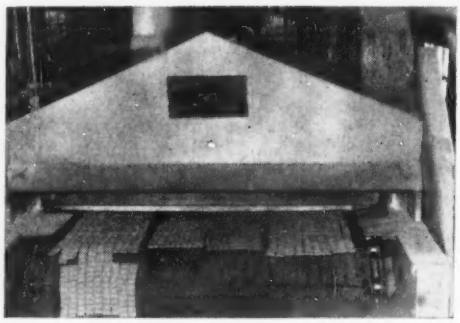
KALAMAZOO MICHIGAN

For more information, use coupon on page 159.

Baking **Ken-L BISKIT** *at Quaker Oats Company emphasizes scope of* **GAS** *usage in food processing*



One of the 65′ Gas-fired travelling ovens in which Ken-L-Biskit is baked under full automatic control.



Crisp, golden brown squares of Ken-L-Biskit come out of the Gas Oven.

Dog food, prepared by Quaker Oats Company, is processed in the same scientific manner, and under the same sanitary conditions as if it were for human consumption.

And, as in commercial baking operations everywhere, GAS is used as fuel for the continuous travelling ovens in which Ken-L-Biskit is processed according to formulae developed by animal nutrition specialists.

Two-Gas-fired ovens, each 65-feet long by 7-feet wide, operate on a 24-hour schedule six days a week. Automatic GAS controls maintain the precise temperature required for processing during the entire cycle.

Although the packaged Ken-L-Biskit is marketed in several grades of granulation, the perfectly baked pet food comes from the ovens in biscuit shape, uniformly baked and golden brown in color.

That's a typical result of baking, roasting or toasting with GAS—the ideal fuel for processing of food in any form. It's the kind of heat processing you can expect because GAS has been successfully applied to virtually every food industry cooking need and experienced Gas Company Representatives can help you use it economically and automatically.

MORE AND MORE THE TREND IS TO GAS FOR HEAT PROCESSING OF FOODS

AMERICAN GAS ASSOCIATION • 420 LEXINGTON AVE., NEW YORK 17, N.Y.

Just Off the Press

New Catalogs and Bulletins
from manufacturers of equipment and supplies
— Free For The Asking —

Food Plant Equipment

Variable Speed Pulley

Fractional hp. variable speed motor pulley using standard belt is explained in Catalog 852.—*Gerbing Mfg Corp., 11800 Milwaukee Ave., Northbrook, Ill.*

Circle 219A on Reader Service Card

Industrial V-Belts

Construction features, conversion tables and diagrams highlight catalog dealing with V-belts.—*Thermoid Co., 200 Whitehead Road, Trenton, N. J.*

Circle 219B on Reader Service Card

Industrial Heating

Heating equipment and full line of accessories is dealt with in catalog. 28 pages.—*Bell & Gossett Co., Morton Grove, Ill.*

Circle 219C on Reader Service Card

High-Capacity V-Belts

V-Belts designed for tough jobs are subject of brochure.—*Allis Chalmers Mfg. Co., Milwaukee 1.*

Circle 219D on Reader Service Card

Industrial Steel

Stainless steel applications in dairy, meat, food processing, and brewing industries are covered in five booklets.—*Allegheny Ludlum Steel Corp., Pittsburgh 22.*

Circle 219E on Reader Service Card

Processing Equipment

Hydro classifiers, dryers and other processing equipment are treated in Bulletin G3-B39. 12 pages.—*Denver Equipment Co., 1400 17th St., Denver 17.*

Circle 219F on Reader Service Card

Air Diffusers

Selection Manual 45 contains comprehensive technical data for simplifying choice of proper air diffusers. 64 pages.—*Anemostat Corp. of America, 10 E. 39th St., New York 16.*

Circle 219G on Reader Service Card

Material Pump

For use in maintenance painting, production finishing, and coating operations is volume delivery material pump covered in booklet. 8 pages.—*DeVilbiss Co., Toledo 1.*

Circle 219H on Reader Service Card

Package-Top Labeler

Adjustable, automatic package top labeler is subject of leaflet.—*Oliver Machinery Co., Grand Rapids 2.*

Circle 219I on Reader Service Card

Portable Agitators

Photos and dimensions explain highlights of agitators and mixers. 6 pages. — *Process Equipment Engineers, Inc., Belding, Mich.*

Circle 219J on Reader Service Card

Air Condenser Filter

Leaflet explains details of condenser filter featuring disposable filter cartridge.—*Hankinson Corp., Pittsburgh 16.*

Circle 219K on Reader Service Card

Can Unscrambler

Booklet deals with can unscrambling system and accessories. — *Dudley Machinery Corp., Mountain View, Calif.*

Circle 219L on Reader Service Card

Gear Coupling

Gear coupling with fully crowned teeth is featured in pamphlet.—*American Flexible Coupling Co., Erie, Pa.*

Circle 219M on Reader Service Card

Jet Cleaning

Model steam-jet cleaner with high pressure dry steam is discussed in brochure. 6 pages.—*Livingstone Engineering Co., 100 Grove St., Worcester 5, Mass.*

Circle 219N on Reader Service Card

Roller Chain Sprockets

Advantages of line of roller chain and sprockets are recounted in Catalog 52-1. 52 pages.—*Chain Belt Co., Baldwin-Duckworth Div., Springfield 2, Mass.*

Circle 219O on Reader Service Card

Canning Equipment

Equipment, accessories, and supplies for the canning plant are subject of Catalog 46.—*F. H. Langenskamp Co., 227-237 E. South St., Indianapolis 4.*

Circle 219P on Reader Service Card

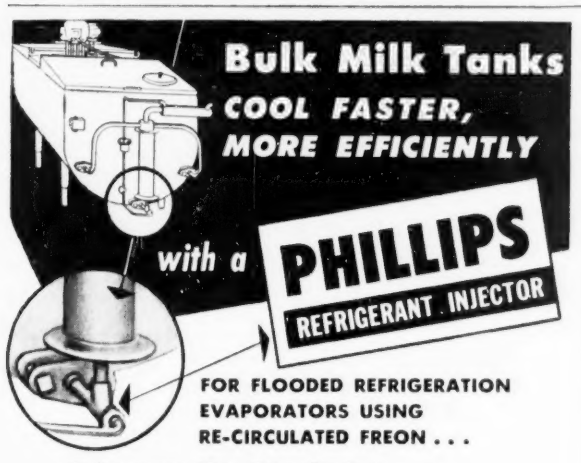
Multi-Stage Pumps

Bulletin, illustrated with diagrams, photos, and cross-section views, treats 2, 3, 4 and 5 stage pumps for circulating and boosting liquids. 12 pages.—*Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles 31, Calif.*

Circle 219Q on Reader Service Card

Impurity Strainers

Designed to remove specific impurities suspended in oil, and water lines and in food product or vegetable oils systems, strainers are subject of Catalog 331. 24



FOR FLOODED REFRIGERATION EVAPORATORS USING RE-CIRCULATED FREON . . .

- ***Increases Heat Transfer Rate . . .*** as much as 50% on bulk milk tank installations
- ***Gives Automatic Flow Control . . .*** Flow control devices other than orifice can be eliminated
- ***Permits Smaller, Lighter Evaporators . . .*** than with regular thermal expansion valves
- ***Eliminates Oil Trapping . . .*** High gas velocity completely wets and scrubs tube walls

ALSO brings operating economies to fan coolers, plate-type direct-expansion coolers, ice accumulators for sweetwater cooling, hardening-room blower units, pipe coils and pipe stands.

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REPRESENTATIVES: THE C & S EQUIPMENT CO.
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LOOK FOR THIS MAN for
Paperboard Materials
Corrugated Shipping Containers
Corrugated Specialties
Folding and Set-up Boxes
Produce House Supplies

Central Fibre is at Your Service!
IN 14 CONVENIENT CITIES

PAPERBOARDS
Corrugating Material—Liner Boards—Folding and Set-Up Boxboards—Can Tube and Cap Stock—Beer Case Partitions. Mills at Quincy, Illinois, Vincennes, Indiana, Tama, Iowa, Denver, Colorado, Hutchinson, Kansas

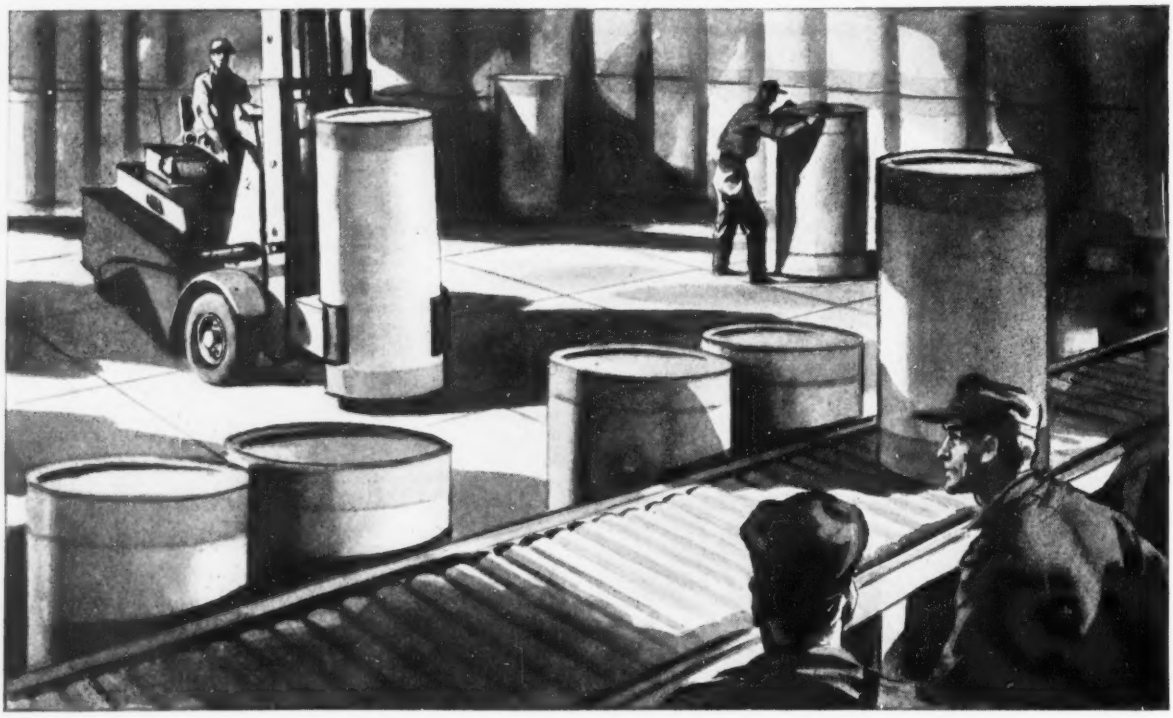
CORRUGATED SHIPPING CONTAINERS
C. F. Downey Box Co., North Kansas City, Missouri
Eggerss & Flying, Omaha, Nebraska
Inland Paper Box Company, Denver, Colorado
Marshalltown Container Co., Marshalltown, Iowa
Pomeroy Manufacturing Co., Vincennes, Indiana
Quincy Container Division, Quincy, Illinois
Western Paper Products Co., Salt Lake City, Utah

FOLDING AND SET-UP BOXES
American Folding Box Co., St. Louis, Missouri
Bruce Carton Company, Memphis, Tennessee
Continental Paper Products Co., Denver, Colorado
Eggerss & Flying, Omaha, Nebraska
Western Paper Products Co., Salt Lake City, Utah

For more information, use coupon on page 159.

MEMO:
TO PLANT ENGINEERS!
For your next plant managers conference!

RADIO speeds material flow!



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For complete information on G-E industrial radio communications equipment, call our local office today or write: *General Electric Company, Section 7053, Electronics Park, Syracuse, New York.*

*Communications Advisory Service

G-E 2-Way Radio Gets Raw Material Where You Want It . . . When You Want It!

BOTH expensive equipment and personnel stand idle when you use an outdated communications system to find raw material and get it into production. *One sure way* to prevent shut-downs on production lines . . . to get the most out of men and equipment every workday . . . is to equip your plant with G-E Industrial 2-Way Radio!

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pages.—*Bethlehem Steel Co., Bethlehem, Pa.*

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Leaflet offers specifications and dimensions of new gland-type needle valves.—*Lunkenheimer Co., Cincinnati 14.*

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Process Pumps

Bulletin 7277 describes line of cradle-mounted, vertically split casing pumps.—*Ingersoll-Rand, 11 Broadway, New York 4.*

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Electronic Motor Control

Bulletin GEA-5829 explains Thyratron motor control drive and its operation.—*General Electric, Schenectady 5, N. Y.*

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Steam Accumulators

Illustrated catalog tells how accumulators automatically store steam to meet peak process demand. 8 pages.—*Foster Wheeler Corp., 165 Broadway, New York 6.*

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Detachable Chains

Chain theory, travel, suggestions and recommendations for use are contained in booklet about steel detachable chains. 44 pages.—*Chain Belt Co. of Milwaukee, Milwaukee 1.*

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Jet Ejectors

Line of jet ejectors for steam, water, or process fluids are considered in brochure.—*Jet-Vac Corp., 73 Pond St., Waltham 54, Mass.*

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Knife Grinder

Knife grinders for either rectangular or V-shaped blades are subject of leaflet.—*Pack-Rite Machines, 407 E. Michigan St., Milwaukee 1.*

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Friction Clutches

Folder 2437 describes friction clutches and clutch couplings, presenting drawings and dimension tables.—*Link-Belt Co., 307 N. Michigan Ave., Chicago 1.*

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Control Equipment

Laboratory Tools

Dialiser, blender and proportioning pumps are dealt with in leaflet.—*Brosites Machine Co., Inc., 50 Church St., New York 7.*

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Booklet covers pair of meters designed for indicating and totalizing as well as control or measurement. 8 pages.—*Hays Corp., Michigan City, Ind.*

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Industrial Scales

Complete line of industrial scales is featured in Catalog 752. 40 pages.—*Detecto Scales Inc., Brooklyn 5.*

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Catalog 53 discusses dimensions and capacities of line of steam and liquid control equipment. 60 pages.—O. C. Breckley Co., 400 W. Madison Ave., Chicago.

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Indicating Recorders

Indicating recorders, controllers, and other instruments are subject of Catalog ND44. 42 pages.—*Leeds & Northrup Co., 4907 Stenton Ave., Philadelphia 44.*

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Bulletin 98214, illustrated with photos and diagrams, concerns dial thermometers. 22 pages.—*Taylor Instrument Companies, Rochester 1.*

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Millivoltmeters

Indicating millivoltmeters are discussed with specifications in leaflet.—*Minneapolis-Honeywell Regulation Co., Wayne & Windrim Aves., Philadelphia 44.*

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Conductivity Controllers

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56 pages.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44.*
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Air-Operated Controllers

Instruments for automatic control of pressure, temperature, liquid level, flow, humidity, pH, electrical variables through air-operated controllers are dealt with in Bulletin A120.—*Bristol Co., Waterbury 20, Conn.*
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Flowmeters

Set of specification sheets covers complete flowmeter line with pictures and data.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44.*
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Truck Scales

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Pressure regulating valves and pressure master controls are featured in Bulletin S-22 CA.—*Swartwout Co., 18511 Euclid Ave., Cleveland 12.*
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Control Valves

Leaflet explains flow control valve designed to regulate piston stroke speed.—*Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9.*
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Process Control

Condensed catalog deals with line of recorders, controllers, indicators, and combustion safeguards. 4 pages.—*Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill.*
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Temperature Control Manual

Bulletin 101 discusses industrial temperature measurement and control. 24 pages.—*Harry W. Smith Inc., Palmolive Bldg., 919 N. Michigan Ave., Chicago 11.*
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Bag Handling

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Line of electric car spotters and drum-type car pullers are discussed in Book 2092. 24 pages.—*Link-Belt Co., 307 N. Michigan Ave., Chicago 1.*
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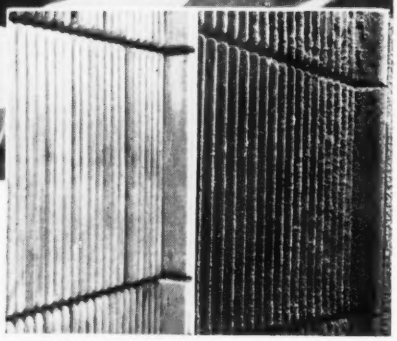

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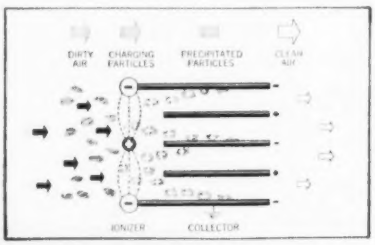

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Technical bulletins describes technology and structure of refined hydrocolloids obtained from sea plants.—*Seaplant Chemical Corp., 63 David St., New Bedford, Mass.*

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Bulletin RW-1a covers line of alloys and electrodes for resistance welding. 24 pages. — *Ampco Metal, Inc., Milwaukee 46.*

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Brochure explains functional chlorinator for use where improved flour treatment is desired.—*Sterwin Chemicals Inc., 1450 Broadway, New York 18.*

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Miscellaneous

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Process of metallizing or metal spraying and its practical applications is covered in Bulletin 51A. 7 pages.—*Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City, N. Y.*

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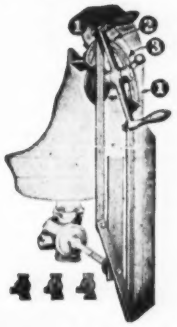

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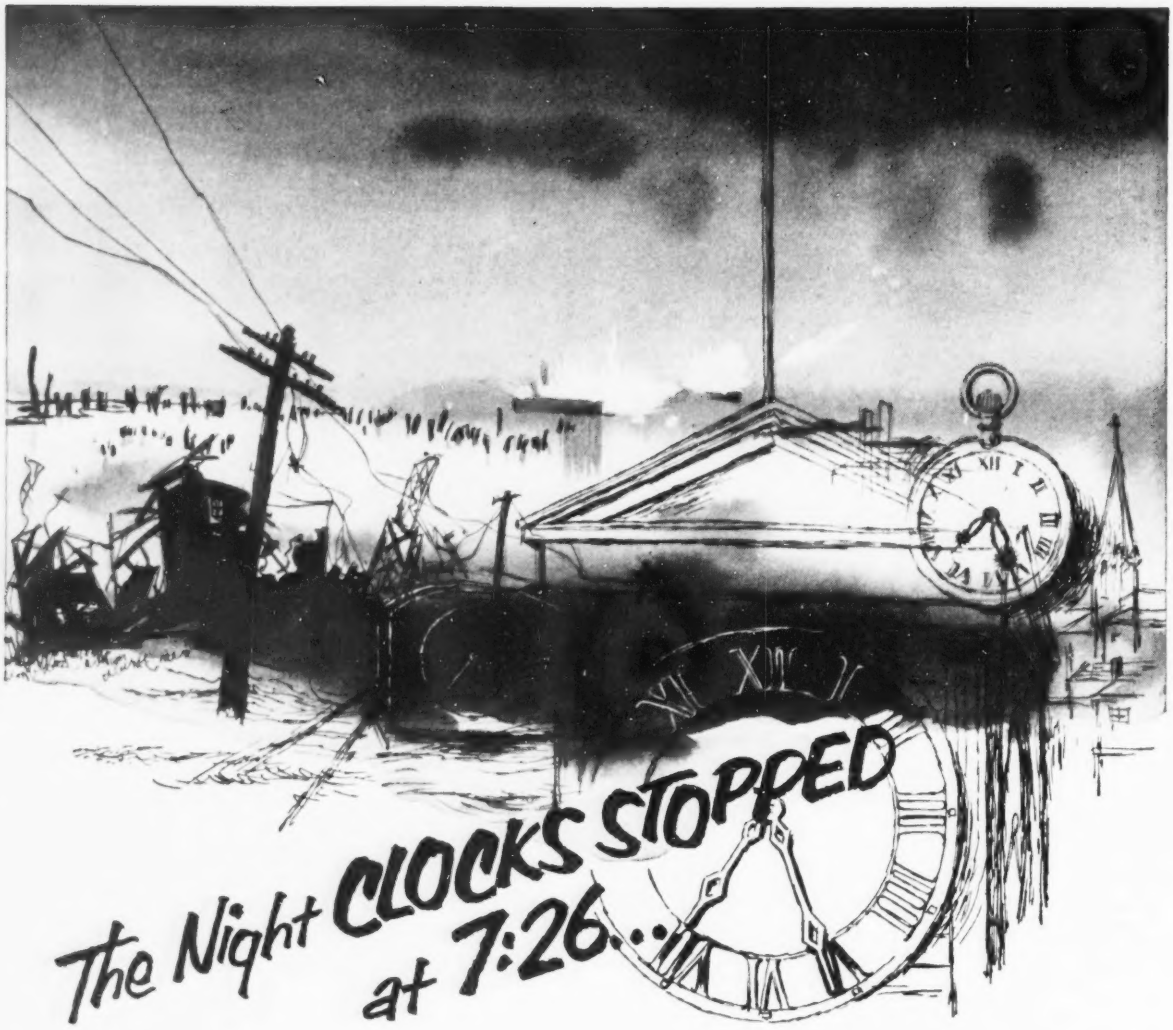

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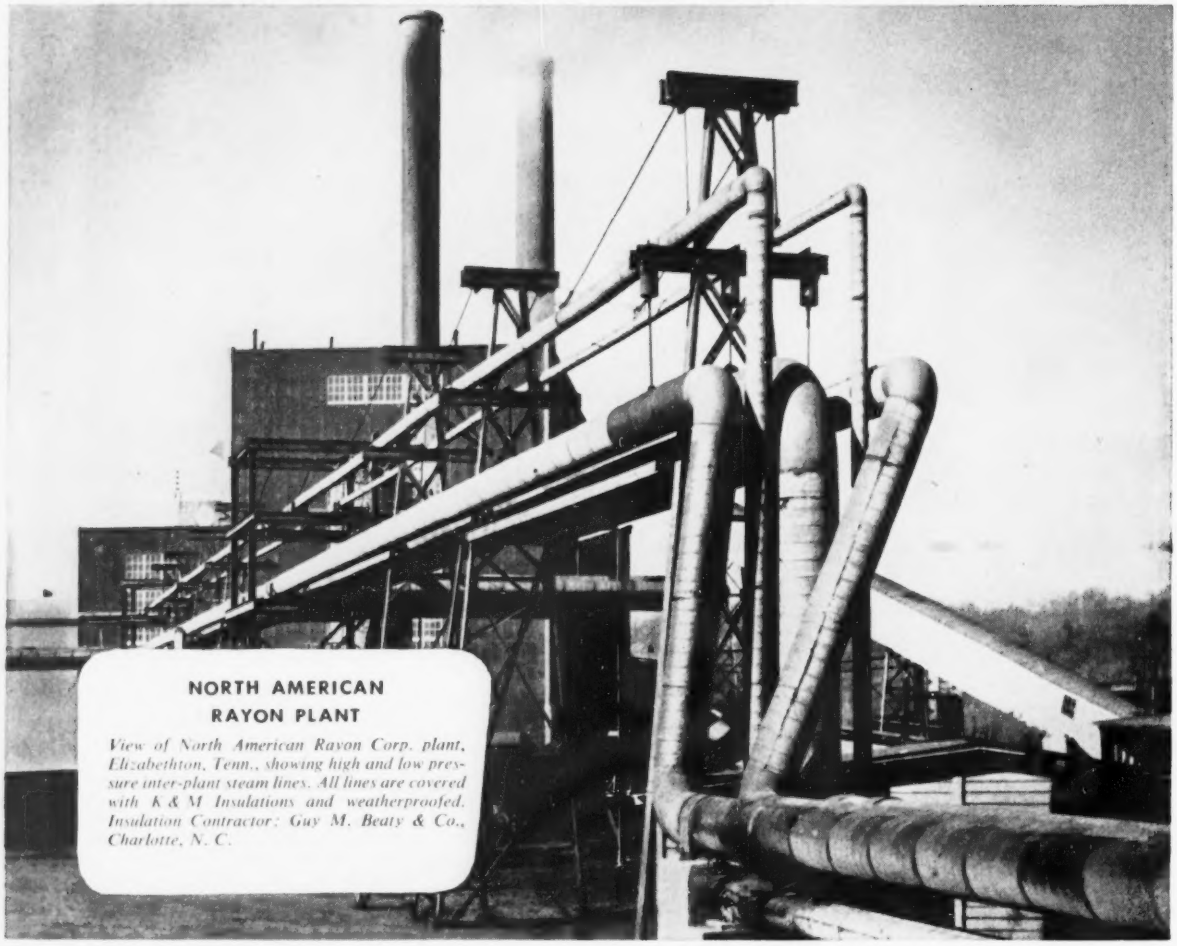

NORTH AMERICAN RAYON PLANT

View of North American Rayon Corp. plant, Elizabethton, Tenn., showing high and low pressure inter-plant steam lines. All lines are covered with K & M Insulations and weatherproofed. Insulation Contractor: Guy M. Beaty & Co., Charlotte, N. C.

Steam takes weather in stride

– under K&M Insulations!

THE steam lines pictured above run more than 2000 feet in the open air—exposed daily to sun, rain, and constant air-temperature change. Yet, because of efficient K&M Insulations, the steam travels these lines with minimum temperature loss. To the plant owners, that means power saved, money saved!

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"Featherweight" 85% Magnesia, a superb insulator, is used as the second layer; and its surface may then be covered and painted, or weatherproofed for outdoor service, as in the illustration above.

K&M Hy-Temp and "Featherweight" in combination are effective on applications up to 1900° F. Two separate layers of insulation with vertical and horizontal staggered joints eliminate heat loss which occurs when expansion of hot piping and equipment causes joints to open in single layer installations. Both materials are made in a variety of sizes, shapes, and thicknesses to suit any application.

Your K&M Distributor is an experienced applicator who will gladly tell you more about these products. Or write directly to us.

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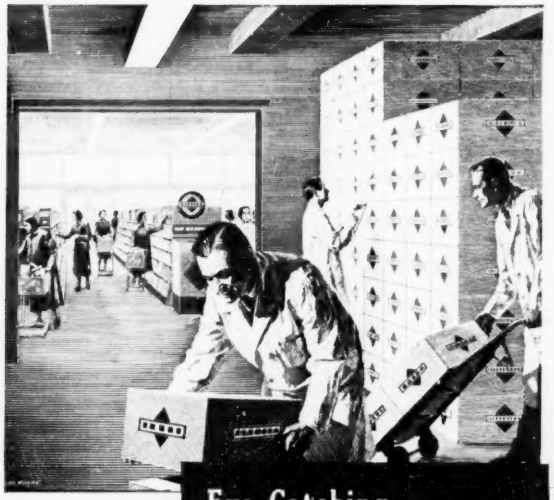

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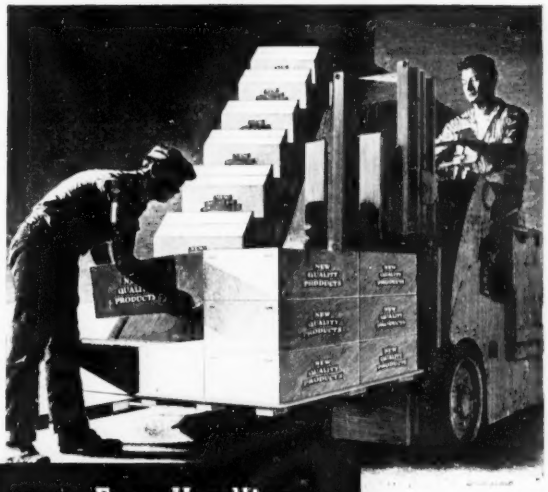

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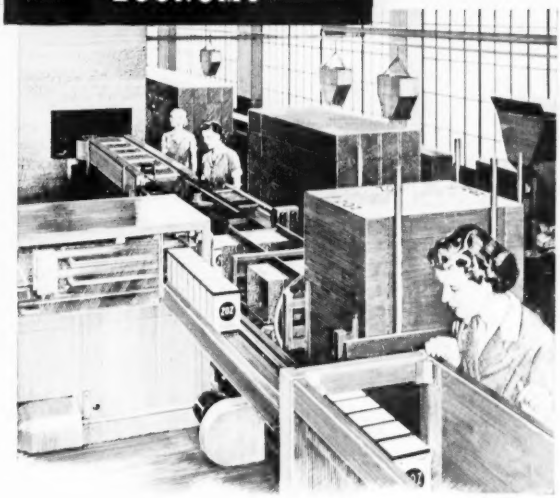

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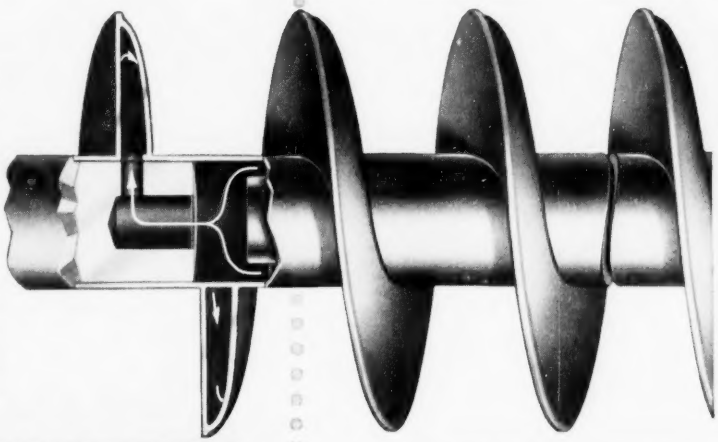
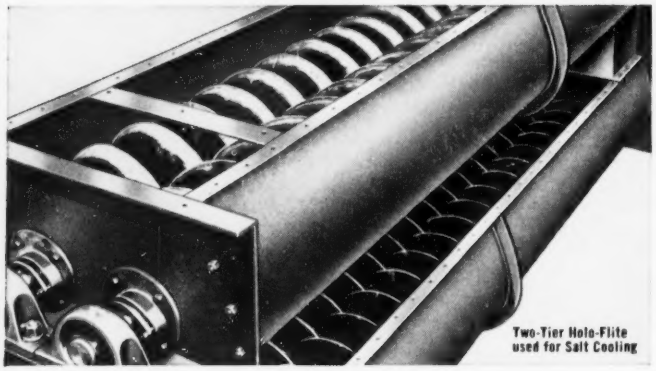
- Up to 80% Saving in Space!
- Permits Continuous, High Efficiency Operation!

Backed by the same well-known organization that pioneered COTTRELL Precipitators, MULTICLONE Collectors and other leading products, the HOLO-FLITE Processor represents a far-reaching advancement in the science of heat-exchanger design. Widely adaptable to various types of cooling and similar applications in industrial processing operations, the HOLO-FLITE handles powdered or granular solids, moist pastes or slurries with equal facility. Moreover, it requires as little as 1/5th the space of other heat exchangers . . . causes no dust, therefore requires no costly or complicated auxiliary recovery equipment . . . and maintains its uniformly high efficiency under modern continuous-flow operations (no stop-and-go "batching" operations are necessary).





Two-Tier Holo-Flite used for Salt Cooling

Unique Simplicity

Basically, the HOLO-FLITE consists of two or more hollow intermeshing conveyor screws that slowly rotate in a trough or tube. The cooling agent circulates through the hollow flights and shafts of the conveyor screws while the product itself "flows" in the trough where it is constantly rotated into, around, over and under the moving heat-exchange surfaces. The continuous mixing, turning, folding action causes a constant change of contact with the heat-exchange surfaces and results in a high rate of heat transfer. Yet the action is so gentle that there is no dusting and little, if any, abrasion of crystalline particles.

Unlimited Capacity

HOLO-FLITE Processors can be readily adapted to virtually any capacity requirement and are in daily operation on such varied products as sand, cement, cottonseed cake, soybean meal, borax, salt, sugar, baby foods, and many other products. Cooled products can be packaged directly from the HOLO-FLITE discharge, saving time, space and additional handling.

Be sure to investigate HOLO-FLITE savings before you install heat-exchange equipment. To insure maximum operating efficiency at low overall cost, each installation is individually engineered to the job using basic stock-size elements. Contact the nearest Western Precipitation office for further details on the revolutionary HOLO-FLITE Processor—or write direct!

FREE! New 8 Page Bulletin describing HOLO-FLITE features and applications will gladly be sent on request!

*Reg. T.M.

A FEW OF MANY HOLO-FLITE ADVANTAGES

WIDE ADAPTABILITY: HOLO-FLITE handles fine-grained, crystalline or powdered solids, pulps, pastes and slurries with equal ease. Heat transfer agent can be refrigerant, cooled or ambient water, or other fluids to provide a wide range of processing temperatures.

SPACE-SAVING COMPACTNESS: Because of its large active heat-transfer surface per cubic foot of space required, the HOLO-FLITE requires only a minimum of space—is 5 to 6 times as compact as other equipment of comparable capacity!

LOW POWER REQUIREMENTS: HOLO-FLITE conveyor screws rotate slowly—usually only 1 to 12 r.p.m. Further, multiple tiers can be driven by one motor, assuring low power consumption.

INSTALLATION FLEXIBILITY: The basic HOLO-FLITE unit is two intermeshing screws in a single trough, but four or six screws per trough can also be installed. Moreover, any number of troughs can be "tiered" on top of one another—trough lengths can be varied from 8 to 20 ft.—screw diameters can be varied from 7" to 16"—to provide virtually any desired capacity in a minimum of space!

Write for full details on the many savings the HOLO-FLITE *Processor can bring to your particular applications.*

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